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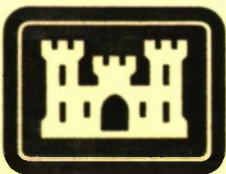
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# **Reexamination**

## **Little Dell Lake Utah**

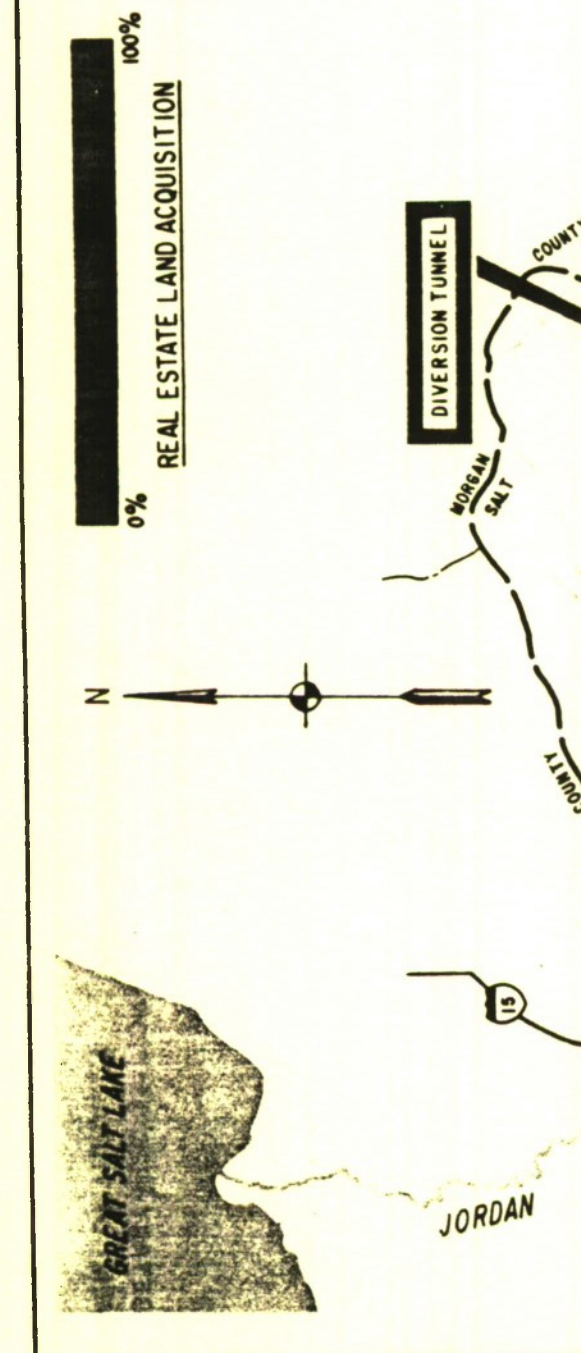


**US Army Corps  
of Engineers**

Sacramento District

**20081029152**

**February 1984**



A locality map showing the area around Salt Lake City, Utah. The map includes Salt Lake City, Mill Creek, and Canyon County. A scale bar indicates distances up to 12,000 feet. A title "LOCALITY MAP" is present.





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REEXAMINATION

LITTLE DELL LAKE, UTAH

February 1984

Sacramento District  
Corps of Engineers

## EXECUTIVE SUMMARY

Reexamination of the Little Dell Lake Project, based on 1983 conditions and price levels and in light of the 1983 flood, reaffirmed the economic feasibility of the project for both the authorized 3-1/4 percent and the current 8-1/8 percent interest rates. The flood control operation and storage dedication developed in the previous general design memorandums have also been affirmed. Modification to the design of the spillway and dam was necessary to accommodate a revised spillway design flood. The spillway was widened from 50 to 100 feet, and the height of the dam was increased by 2 feet to an elevation of 5844.0 feet. In addition, recreation facilities have been reduced by about 65 percent to be consistent with current recreation demands in the area and with the desires of local interests.

The first cost of the project is currently estimated at \$81,430,000, reflecting the spillway and associated modifications and the reduced recreation development. A comparison of the estimated \$7,040,000 in annual benefits, including \$2,800,000 for flood control, \$1,100,000 for water supply, and \$3,140,000 for recreation, with the \$3,278,000 annual economic costs, results in a benefit-cost ratio of 2.1 to 1, based on the project interest rate of 3-1/4 percent. Using the Fiscal Year 1984 interest rate of 8-1/8 percent, the project benefits would total \$8,450,000 annually. Annual economic costs would be \$7,405,000, and the benefit-cost ratio would be 1.1 to 1 for the current plan.

Cost allocations were made to reflect updated economic costs and benefits and to reflect the reduced recreation features and the travel cost-benefit method of analysis. Based on the cost allocations, about 53.4 percent of the first cost would be assigned to flood control, 20.4 percent to water supply, and 26.2 percent to recreation.

Local interests costs were developed based on traditional cost sharing and current cost sharing being used for budgetary purposes. Under traditional cost sharing, local interests would be required to contribute about \$3,370,000 for flood control, \$16,330,000 repayment for water supply,

and \$2,055,000 for recreation. The total local cost would be \$21,745,000, representing about 26.7 percent of the total project cost based on 1983 prices, not including future inflation. Current cost-sharing policy, including local interests contributing 35 percent of the flood control costs, 100 percent of the water supply costs, and 50 percent of the cost allocated to recreation, would require reimbursement of \$41,835,000. This would include \$15 million for flood control, \$16,320,000 for water supply, and \$10,515,000 for recreation.

Salt Lake City, Salt Lake County, State of Utah, and the Utah Congressional delegation all support the project. Local interests have indicated the willingness to contribute \$22 million upfront to expedite construction of the project. This would, in effect, cover the cost of traditional cost sharing. Local interests are generally acquainted with the current cost-sharing criteria; however, it is unknown at this time whether increased local cost sharing would affect support of the project.



REEXAMINATION  
LITTLE DELL LAKE, UTAH  
FEBRUARY 1984

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2	Reservoir Content and Flood Control Reservation
3	Reservoir Operation (2 sheets)
4	Recreation-Travel Cost Map
5	Spillway - Plan, Profile, Sections and Detail
6	Spillway Width versus Pool Elevation

## LIST OF ATTACHMENTS

1	DAEN-CWP-W Memo dated 1 November 1983, Re- examination of the Little Dell Lake Project, Utah - Information Memorandum
2	Salt Lake County Letter, dated 10 June 1983
3	Salt Lake County Letter, dated 10 January 1984
4	Construction Schedule from Phase II GDM
5	List of Design Memorandums

REEXAMINATION  
LITTLE DELL LAKE, UTAH  
FEBRUARY 1984

INTRODUCTION

The Little Dell Lake project was authorized for construction by the Flood Control Act of 1968. Modifications to the authorized plan, reflecting Phase I and Phase II General Design Memorandum (GDM) studies, were approved by Section 170 of the 1976 Water Resources Development Act. The plan of improvement, as presented in the Phase II GDM, provides for the construction of a dam 253 feet high, creating a lake with a gross capacity of 30,000 acre-feet for flood control, municipal and industrial water supply, and recreation. The lake would be operated in conjunction with the existing Mountain Dell Reservoir (capacity 3,200 acre-feet) on Parleys Creek for flood control and water supply. Location is shown on map inside of front cover. In October 1982, an Office Study, completed in response to Senate Report No. 97-256, contained a reanalysis of the justification for the Little Dell Lake project to reflect 1982 price levels and conditions.

This report has been prepared to provide information and analysis in response to a DAEN-CWP-W, Memorandum for the Assistant Secretary of the Army (Civil Works), Subject: Reexamination of the Little Dell Lake Project, Utah - Information Memorandum, dated 1 November 1983. (Attachment 1.) The reexamination includes a reassessment of the needs for, effectiveness of, and capability of the major project functions; updated economic and financial aspects of the project, including updated benefit-cost analysis, cost allocation, and cost-sharing criteria; and updated project design and construction scheduling considerations. This reexamination supplements previous GDM's, which are listed in attachment 5.



## REEXAMINATION OF PROJECT PURPOSES

### FLOOD CONTROL

The flood control function was reexamined in the light of the 1983 flood to evaluate the potential effectiveness of the project in controlling such a flood, and to update the flood damages and potential project benefits.

The flood of 1983 broke previous records for snowmelt runoff on nearly every stream in the Salt Lake Valley. The record runoff was preceded by heavy precipitation in the fall of 1982 which saturated the soil mantle. Heavy accumulation of snow during the winter and the spring followed by a late spring and a sudden warming trend triggered the record runoff and flooding that persisted for nearly a month and turned streets into rivers. Flooding on Parleys, Emigration, and Red Butte Creeks led to creation of the "1300 South Street River" and caused widespread flooding along the stream courses and damages to many bridges and local neighborhood areas and to portions of the conduit system. Sediment plugged portions of the conduits and clogged streams in valley reaches and also reduced the capacity of the lower Jordan River. The 3,200 acre-foot Mountain Dell Reservoir on Parleys Creek provided limited control. The dam came within 12 hours of overtopping but was spared as the weather moderated and saved Salt Lake City from a more serious flood situation.

The 1300 south conduit system was repaired, and channels and conduits were cleaned following a September 1982 rain flood. However, the facilities proved inadequate, as floodflows exceeded conduit capacities in May of 1983. Manhole covers were secured and heaped with sandbags to allow the conduits to operate under pressure. However, water overflowed the conduit entrances and fountained from blowouts. Overflow was directed along streets using sandbag barriers. On 26 May 1983 Salt Lake City officials made the decision to turn 1300 South Street from below 700 East Street to the Jordan River into an open floodway. City, county and contractor forces, along with about 5,000

volunteers, joined efforts and by 28 May 1983 had formed the floodway using sandbag levees above State Street and earthen embankments lined with plastic below State Street. The floodway was in use from about 29 May to 11 June and during that time conveyed up to about 700 cfs in conjunction with the underground conduits. About one-half the flow was conveyed by the conduits, and the residual was conveyed along the street. During the flood, traffic was seriously disrupted, neighborhoods were severed, businesses affected, and water supplies threatened by contamination.

The 1300 South Stream Group, consisting of Parleys Creek, Emigration Creek, and Red Butte Creek (project streams for Little Dell Lake Project), sustained approximately \$10 million in damages during the 1983 flood. The damage figure is low, considering what might have occurred had there not been an extraordinary flood fight by Salt Lake City and volunteer support in converting 1300 South Street into a sandbagged and leveed river for nearly a 2-mile reach. These efforts were significant in preventing a major disaster and in minimizing flood damages. Table 1 outlines components of flood related costs, damages, and measurable effects, including allowance for flood fight cost, flood damages, volunteer support, and traffic disruption.

TABLE 1

LITTLE DELL LAKE, UTAH  
1983 FLOOD DAMAGES

<u>Damage Category</u>	<u>Damages</u>
Public facilities damage <u>1/</u>	\$7,400,000
Sediment removal (Jordan River)	450,000
Emergency costs	
Flood fight <u>2/</u>	1,650,000
Volunteer efforts <u>3/</u>	210,000
Traffic disruptions	<u>350,000</u>
Total	\$10,060,000

1/ Includes channel bank erosion, sedimentation, slope stabilization, debris removal and cleanup, and damages to utilities, buildings, and roadways. From the "Preliminary Flood Damage Assessment Report for the 1983 Snowmelt Flood in Salt Lake County" by the Salt Lake County Department of Public Works.

2/ Work done in connection with the emergency protection of streets and property. Includes cost of equipment and labor (police, fire department, public works personnel, etc.).

3/ Approximately 62,500 manhours x \$3.35/hour (minimum wage) = \$210,000. Calculated in order to estimate a value for their efforts since they could have spent their time doing other things.

The above damages are preliminary and do not reflect all of the damages sustained in the flood.

Because of the magnitude of the flood, reevaluations have been completed to determine the possible effects on project hydrology, the project flood control operation, and the economic flood damage analysis. Although the 1983 flood was a record event, the floodflows plot within the confidence limits of the flow frequency curves and would not alter the basic hydrology contained in Design Memorandum No. 3, Hydrology,

The flood control operating criteria developed in the Phase I GDM, September 1974, were used as a basis for flood routing analysis of the 1983 runoff. The analysis affirmed that the project features and proposed operation would effectively reduce peak flows to nondamaging proportions. The tabulation below shows the nondamaging capacity at key locations and compares the peak mean daily flows at these points for "without" and "with" project conditions.



Index Point	Nondamaging Capacity	Without Project Unregulated	Mountain Dell Regulation	1983 Floodflows with Project
Parleys Creek above 1300 South Conduit	200 cfs	605 cfs	460 cfs	180 cfs
1300 South Conduit below Parleys Confluence	300 cfs	833 cfs	700 cfs	270 cfs

Chart 1 shows the runoff hydrographs for the period April through June 1983 for "without" and "with" project conditions and illustrates the effectiveness in reducing the floodflows to nondamaging proportions. Chart 2 shows a simulated operation of Little Dell Lake and Mountain Dell Reservoir and illustrates the drawdown for flood control based on the runoff forecast and the operating criteria. The chart also depicts storage of the floodflows and shows that the flood control drawdown would have provided adequate capacity to control runoff over and above the downstream nondamaging channel capacity.

#### WATER SUPPLY

The municipal and industrial water supply function was updated and evaluated in the "Little Dell Lake, Utah, Office Study, Update of Phase II GDM, Economic Evaluation," dated October 1982. Present water supplies, averaging 189,500 acre-feet annually, are adequate to meet requirements until the year 1985 under critical runoff conditions. The Little Dell Lake water supply, in combination with irrigation conversion to municipal use, potential exchanges, and increased use of direct flow, will extend service area supplies until development of the Bonneville Unit of Central Utah Project facilities can be completed. Local interests are aware that water shortages are possible as early as 1985 and that the Little Dell Lake project cannot be completed until about 1990. However, the project has been identified as the most logical source of firm water supply to meet near future needs. Local interests understand that interim shortages may occur during the 1985-90 period should a drought occur.

## RECREATION

The recreation reexamination included reevaluating the need, support, and timing for recreation at the project and included reevaluating recreation use and benefits based on current data and the travel cost methodology as described in Principles and Guidelines. Both the authorized interest rate of 3-1/4 percent and the current interest rate of 8-1/8 percent have been used in the evaluation.

Recreation development and use were examined for a minimum plan for public health and safety (one road end), a moderate level plan (desired by the recreation sponsor), an optimum plan, and a staged development plan. A moderate level single-purpose plan was developed for cost allocation purposes.

Market Area and Recreation Demand. - The recreation market area and demand were reanalyzed and updated to reflect current trends. The previous General Design Memorandums described the market area as the Salt Lake City metropolitan area, 13 miles from Little Dell with use estimated at a 1.4 per capita rate. Demand was projected to gradually build up to the maximum practical use level by the tenth year of operation. New demand estimates were based on travel cost techniques, with an expanded market area of six counties ranging from 13- to 50-mile travel distance. Initial demand (1990) is estimated to be 350,000 recreation days with a maximum practical use of 980,000 recreation days which could be sustained by 2020. The estimated demand for 2090 is 2,020,000 recreation days.

Population growth trends are shown for the market area.

Table 2

Population Growth Trends  
Little Dell Lake Project  
Recreation Market Area

County	1981	1990	2040	2090
Salt Lake	641,000	785,900	2,901,200	3,805,000
Summit	11,000	13,500	49,800	65,300
Davis	154,000	188,800	697,000	914,100
Morgan	5,100	6,300	23,100	30,300
Wasatch	8,800	10,800	39,800	52,200
Weber	148,000	181,500	669,800	878,500

According to local studies, the market area continues to be deficient in most types of water-oriented recreation and group facilities, particularly group picnic facilities. Local interests have also identified a demand for group camping facilities.

A brief description of alternative levels of recreation development analyzed is included in the following paragraphs.

Minimum Plan for Public Health and Safety. - This plan would have one road-end access area with capacity for approximately 25 cars. It could support 25,000 recreation days during the summer recreation period. Facilities would be limited to chemical toilets, trash receptacles, graded parking areas, turnaround, and traffic barriers. In addition, 20,000 recreation days of winter use could be accommodated at the access area.

Moderate Plan. - This plan is scaled down from the Optimum Plan to support 350,000 recreation days use including approximately 20,000 days of winter sports use. Additional facilities could be constructed in the future as described in the stage development plan. The activities and percentages are summarized as follows:

Summer Use

Picnicking - 50% (80% of which will be group picnicking)  
Fishing - 10%  
Boating - 10%  
Swimming - 20%  
Other Uses - 20%

Winter Use

Snowmobiling - 50%  
Sledding - 15%  
Cross-Country skiing - 35%

Recreation facilities have been planned in cooperation with the Salt Lake County Division of Recreation, Parks and Multi-Purpose Centers. Facilities would include a Park Manager's office with information display; three group picnic shelters scattered throughout the picnic area, each with a capacity for 200 people; one group camping area with capacity for 100 people; 75 family picnic sites; a swimming beach; a two-lane boat launching ramp,



utilizing existing Highway 65, and a car-top boat launch area; a biking/hiking trail; and open play areas. In addition, support facilities such as two-way access and one-way circulation roads, parking, restroom facilities, a water supply, and landscaping would be provided. The facilities proposed would also serve to support winter use activities. The Little Dell Pony Express Station, built in 1860, will be resited in the recreation area and used for public interpretation.

About 50 acres of land would be acquired specifically for recreation. Other project land would also be used for recreation and other purposes.

Optimum Plan. - The optimum plan, based on maximum practical future use of the area, consists of 7 group picnic shelters and 75 family picnic sites with associated parking, a sand swimming beach, a two-lane boat launching ramp and car-top boat launch area, play areas, youth group campsite, relocation and use of the Little Dell Station for public interpretation, a visitor center, and a hiking and biking trail. The plan includes such support facilities as access and circulation roads, restrooms and sanitary disposal facilities, water supply and distribution systems, landscaping, and parking. The optimum plan would require approximately 290 acres of recreation land. The optimum plan would support the maximum practical use level of 980,000 recreation days.

Staged Development Plan. - Development would occur in two phases. Initial development would be as described in the moderate level plan. Other facilities would be added over time, paced to reflect demands and the desires of the local sponsor. Use would be as follows:

<u>Year</u>	<u>Amount</u>
1990	350,000
2000	550,000
2010	887,000
2020 (MPU)*	980,000
2090	980,000

The plan would require the same 290 acres of recreation lands as the optimum plan.

Based on all factors considered, the moderate level plan is recommended for the Federal project because it appears to reasonably meet current demands and is the level of recreation development desired by the recreation sponsor.

Moderate Level Single-Purpose Plan. - For cost allocation purposes, a single-purpose plan was formulated that consists of a 4,000 acre-foot lake with a surface of approximately 78 acres. This would be at the Little Dell Lake site and have the same facilities and use as the moderate level plan. A total of approximately 280 acres of lands would be needed for the lake and recreation facilities.

#### PROJECT OPERATION

The proposed 30,000 acre-foot Little Dell Lake will be operated to provide flood control, in conjunction with the existing 3,200 acre-foot Mountain Dell Reservoir, to conserve water for municipal and industrial purposes, and to provide for outdoor recreation opportunities. A maximum of 27,000 acre-feet would be reserved at Little Dell Lake in conjunction with 3,000 acre-feet of reserved space in existing Mountain Dell Reservoir, on a forecast basis for control of snowmelt floods. A minimum of 1,000 acre-feet of space will be reserved at all times in the two reservoirs for control of floods resulting from cloudbursts or general rainstorms.

The 30,000 acre-feet of flood control space, including 3,000 acre-feet of reserve space in the Mountain Dell Reservoir, will provide in excess of standard project flood protection for control of snowmelt floods; and the 1,000 acre-feet of permanent flood control space will provide protection against cloudburst and general rainfloods up to a 100-year event. An inactive pool of 3,000 acre-feet would ensure a minimum pool for recreation and operation purposes.

Major floods in the area occur as a result of snowmelt runoff and can be reasonably well forecasted far enough in advance to evacuate the reservoirs as necessary. Accordingly, the snowmelt flood control space is proposed on a forecast basis, beginning on 16 February and extending through 30 June of each year. In addition, a minimum of 300 acre-feet in Little Dell Lake and 700 acre-feet in Mountain Dell Reservoir is to be provided throughout the year for the control of rainfloods. The snowmelt parameters in the operating criteria are designed to assure control at the damsites of all historical floods and a hypothetical snowmelt flood exceeding in magnitude the standard project snowmelt flood. The flood control operation is consistent with maximum usage of the storage space for conservation in that the lake should be essentially full to the conservation pool level from the storage of floodflows. With exception of the minimum flood control reservation, the water would be held in storage until needed for water supply or until conditions required that the storage be drawn down for expected floods.

Little Dell Lake and Mountain Dell Reservoir will operate as a coordinated unit for water supply and flood control. Surplus water will be stored under project operation for use during low runoff periods. Following the critical water supply drawdown periods, essentially all inflow except that required for maintenance of minimum streamflow will be stored to effect a rapid recovery of water supply in the event of a succeeding low runoff period and to provide recreation opportunities. The conservation pool will be 26,700 acre-feet at Little Dell and 2,300 acre-feet at Mountain Dell Reservoir. Thus, a combined conservation pool of 29,000 acre-feet will be used for municipal water supply. Chart 3 depicts reservoir operation for water supply and flood control. The operation reflects flood control drawdown during the February through June period as needed for snowmelt flood control and depicts utilization of the flood control release for water supply to the extent possible. The chart also depicts the capability of flood control drawdown and refilling to meet conservation needs.



## DESIGN AND PRECONSTRUCTION CONSIDERATIONS

The reexamination studies included modification of the spillway and height of the dam to accommodate an increase in the probable maximum flood (PMF), as outlined in the following paragraphs.

Spillway design studies performed for DM #4, April 1976, were based on a cloudburst type PMF having a peak discharge of 23,000 cfs and a total volume of 5,130 acre-feet. Plate 12 of DM #4 (attached at Chart 5) shows pertinent data for that design, including a maximum pool elevation, 5836.5 for the routing. Top of dam elevation 5842.0 was selected, based on a minimum freeboard of 5.0 feet.

The current studies were for a larger flood based on Hydrometeorological Report No. 49, dated September 1977. The general rain type PMF has a peak hydrograph ordinate of about 34,600 cfs and a volume of about 7,600 acre-feet. The above referenced Plate 12 from DM #4 is marked to indicate changes based on current studies. Chart 6 shows a spillway width vs. maximum pool comparison. A spillway base width of 100 feet was selected, based on an economic comparison. This resulted in a maximum pool of elevation 5838.5. Top of dam elevation 5844.0 was selected to provide the same freeboard as previously used.

The spillway modification will result in the need to relocate State Highway 65 away from the spillway to allow spillway expansion. It is anticipated that construction studies involving real estate and relocations will be completed with FY 84 funds. Other preconstruction activities during FY 84 include outlet works plans and explorations for relocations, embankment, and spillway features. Completion of these efforts will finalize preconstruction activities in support of the first-year construction.



## ECONOMIC EVALUATION

### BENEFIT ANALYSIS

Flood control. - Flood damages and flood control benefits were reanalyzed in the 1982 Office Study to reflect the 1982 inventory, the value of property in the flood plain, and the susceptibility to flooding; and to establish average annual flood damages expected in the future without and with the Little Dell Lake project. The computer model developed for the 1982 study was used to develop damages for the 1983 floodflows (without flood fighting conditions) and resulted in estimated damages of about \$140 million. Data from the model are summarized in Table 3.

TABLE 3  
FLOOD DAMAGE ANALYSIS  
1983 FLOOD MAGNITUDE  
(OCTOBER 1983 PRICES)

<u>Reach</u>	<u>Flow W/O Project</u>	<u>Frequency</u>	<u>Damages W/O Project</u>	<u>Acres Flooded (a)</u>	<u>With Project Flow</u>	<u>Damages with Project</u>
2	700 cfs	0.33	\$ 11,400,000	250	300 cfs	0
3	700 cfs	0.33	105,000,000	710	300 cfs	0
4	700 cfs	0.33	17,300,000	210	300 cfs	0
5	210 cfs	1.2	3,700,000	160	125 cfs	\$20,000
1A	144 cfs	1.4	<u>100,000</u>	<u>10</u>	90 cfs	<u>0</u>
Total			\$137,500,000	1,340		\$20,000

(a) Without project and without flood fight.

The conditions during the 1983 flood allowed staging of a partially successful flood fight that minimized flood damages. In the absence of an effective flood fight, up to 1,400 acres would have been inundated. The area has been extensively developed for commercial, industrial, and residential uses with developments valued at \$1 billion. Based on the current inventory and value of property in the flood plain and the potential magnitude of flooding from the 1983 runoff, flood damages would have approached an estimated \$140 million in the absence of an effective flood fight. When

planning for flood control facilities, it should not be assumed that flood fights will always be successful. A good example is the April-May 1952 snowmelt flood. Despite about 2 weeks of round-the-clock flood fighting, approximately 1,200 acres involving about 75 city blocks of residential, industrial, and commercial areas were flooded, resulting in about \$2 million in damages (1952 prices). In 1983, Salt Lake City was spared from potential disastrous impacts on life, safety, health, and other public impacts in addition to major economic losses which could have occurred. However, because of the variability of flood problems due to snowpack, weather, watershed conditions, channel conditions, and uncertainty of flood fight efforts, definitive conclusions cannot be reached on the effectiveness of future flood fighting efforts. Previous flood control evaluations recognize these hazards and are believed to represent the best public interest in developing flood control measures for the area. Accordingly, the flood control economic analysis for the Little Dell Lake project developed for the Office Study completed in 1982 is considered appropriate for present uses.

Average annual flood control benefits for the project were updated to 1983 price levels for the 1300 South Stream Group, accounting for 90 percent of the project flood control benefits. Project benefits for other damaged areas were updated by factors and adjustments to reflect current prices and conditions. Average annual equivalent flood damages for preproject and project conditions and project benefits for snowmelt and rain flooding for the 1300 South Stream Group area are shown in Table 4.

TABLE 4

Average Annual Equivalent Flood  
Damages and Benefits  
Little Dell Lake Project  
(1983 Prices and Future Conditions)  
3-1/4 Percent Interest Rate

<u>Damage Area</u>	<u>Type of Flood</u>	<u>Preproject Damages</u>	<u>Residual Damages</u>	<u>Benefits</u>
1300 South Stream Group	Snowmelt	\$2,610,000	\$10,000	\$2,600,000
1300 South Stream Group	Rainflood			\$10,000
Parleys Canyon	Snowmelt			\$50,000
	Rainflood			\$10,000
Emigration Canyon	Snowmelt			\$90,000
	Rainflood			\$10,000
Lower Jordan River	Snowmelt			<u>\$30,000</u>
TOTAL FUTURE BENEFIT				\$2,800,000

Total Future Benefit (8-1/8 Percent Interest Rate) \$2,780,000.

Flood control economic analysis was developed prior to Principles and Guidelines; however, the analysis is essentially in compliance with recent guidance except for the following items.

1. The section that is entitled "Report and display procedures" (P&G, 2.4.17) discusses the 500-year flood and how it should be fully described. The inclusion of a 500-year flood would not significantly affect the flood damage reduction benefits due to the infrequent nature of the event. Furthermore, the SPF event is reflected in the analysis and essentially meets the 500-year flood risk requirement.

2. The element of risk (2.4.15(c)) in P&G has not been addressed in the most recent economic analysis.

Water Supply. - The water supply benefits for Little Dell Lake project are based on the cost of the most viable alternative in accordance with Principles and Guidelines.

The most likely alternative to water supply storage in Little Dell Lake is storage at the Argenta site on Big Cottonwood Creek. Such storage was identified in the Phase II GDM studies as the single-purpose alternative. The first cost of constructing a 30,000 acre-foot capacity reservoir at the Argenta site is estimated at \$53,880,000. Table 5 below shows the estimated first and annual costs based on the 3-1/4 and 8-1/8 percent interest rates, the yield of the 30,000 acre-foot facility, and the cost per acre-foot of yield.



Table 5

WATER SUPPLY ALTERNATIVE  
ARGENTA DAM AND RESERVOIR  
COST DATA  
(1983 PRICE LEVEL)

	<u>3-1/4 Percent</u>	<u>8-1/8 Percent</u>
First Cost	\$53,880,000	\$53,880,000
Interest During Construction	\$1,420,000	\$4,450,000
Investment Cost	\$55,300,000	\$58,330,000
Annual Cost	\$2,125,000	\$4,900,000
Annual Yield	10,700 AF	10,700 AF
Annual Cost Per Acre-Foot Yield	\$200	\$460

The municipal and industrial water supply benefit for the Little Dell Lake project is based on a project yield of 5,500 acre-feet annually established in the 1982 Office Study, and the alternative unit cost for water supply as shown below.

<u>Interest Rate</u>	<u>Project Yield</u>	<u>Cost Per AF Yield</u>	<u>M&amp;I Benefit</u>
3-1/4 Percent	5,500 AF	\$200	\$1,100,000
8-1/8 Percent	5,500 AF	\$460	\$2,530,000

Recreation. - The project is normally exempt from Principles and Guidelines. Four levels of use have been analyzed. However, for this analysis, recreation use and benefits were developed based on analysis of the recreation market area demands and the travel cost procedure described in Principles and Guidelines. The analysis was based on 1981 use data at three Utah State recreation developments within a 50-mile proximity of the Little Dell Lake project.

Existing resources and origin of visitors for the three State parks and proposed Little Dell Lake are described below.

Deer Creek Lake has 2,965 surface acres. Facilities for camping, boating, and general and group picnicking are provided to meet needs primarily from five counties having a travel distance of 8 to 72 miles to the park.

East Canyon Lake has 684 surface acres. Facilities for camping, boat launching, and general and group picnicking are provided to meet needs primarily from seven counties having a travel distance of 14 to 72 miles.

Rockport Lake has 1,189 surface acres. Facilities for camping, boat launching, and general and group picnicking are provided to meet needs primarily from eight counties having a travel distance of 16 to 136 miles.

Proposed Little Dell Lake would have a surface of 320 acres. Facilities would be provided for boat launching (no powerboats); general and group picnicking; fishing; trail use; and group overnight use. The estimated market area extends 50 miles.

See Chart 4 for locations of the three lakes. The population use, travel distance, and per capita use factors are shown in Table 6.

The use observed during a site survey was adjusted to delete the use associated with motorboating since Little Dell Lake will be smaller and will not provide for motorboating. The portion of the estimated use for each park

was then divided by the county population to obtain a per capita rate. Distance to the estimated centroid was measured using one-way road mileage. These data were used in developing a regression formula to predict potential recreation use from within the Little Dell Lake recreation market and additional willingness to travel to compute travel cost values. This resulted in a 1981 potential use estimate of 340,373 recreation days (without the potential winter use, an estimated 20,000 recreation days use) and a travel cost value of \$8.96 per recreation day. The second stage demand data are shown in Table 7.

The potential level of use that could be accommodated by the four levels of recreation development was estimated using the per capita rate and population by decade and was limited to the estimated 980,000 maximum practical use limit. Benefits were calculated at both the 3-1/4 percent authorized rate and at the 8-1/8 percent current rate. The potential recreation use and benefits are shown in Table 8.

Table 6

Little Dell Lake Project  
Recreation-Travel Cost Benefit Data

County Origin	1981 Population	Rockport Lake		Deer Creek Lake		East Canyon Lake		Potential 1/ Little Dell Lake	
		P.C. Rate/Distance		P.C. Rate/Distance		P.C. Rate/Distance		P.C. Rate/Distance	
Salt Lake	641,000	.26244/32		.30836/32		.18586/28		.3852/13	
Summit	11,000	.40791/16		1.2476/28		.07290/28		.3398/24	
Davis	154,000	.06119/36		.07253/72		.13848/36		.3232/28	
Morgan	5,100					.15725/14		.3232/28	
Wasatch	8,800			1.0120/8				.3067/32	
Weber	148,000	.01516/56				.08541/36		.2406/48	
Tooele	26,900	.08342/80				.02981/68		.2077/56*	
Utah	229,000	.01959/56		.34810/20				.2077/56*	
Cache	60,000					.04810/72		.0755/88*	
Carbon	23,200	.09672/120						.0567/120*	
Uintah	22,100	.10154/136						.1558/144*	

1/ Predicted per capita rate based on  $Y = 0.43894 - (.00413 \times \text{distance})$

Example: For Summit county  $Y = 0.43894 - (.00413 \times 24 \text{ miles}) = 0.33982$

\*Included only in willingness to travel for second stage demand curve. The potential use is estimated to originate from within 50 mile market area. As a result, only those counties within 50 miles of Little Dell Lake are included in Table 6.



Table 7

Stage 2 Demand Data Based on 1981 Potential Use  
Distance/Per Capita Regression

Distance (miles) x (1)	Population (2)	Per Capita Rate Y (3)	Recreation Use (days) "0" added miles (4)	Incremental travel in miles (plus column 1)					Total Per Capita Use (columns 5-10) (11)	No. of Trips Per capita. Multiply Col. 2 x Col. 11 (12)
				20 (5)	40 (6)	60 (7)	80 (8)	100 (9)	120 (10)	
Salt Lake 13	641,000	.3852	246,913	.3026	.2199	.1372	.0545	-.0281	.6861	439,790
Summit 24	11,000	.3398	3,737	.2571	.1744	.0918	.0091	-.0735	.4589	5,048
Davis 28	154,000	.3232	49,773	.2406	.1579	.0753	-.0074		.4664	71,826
Morgan 28	5,100	.3232	1,648	.2406	.1579	.0753	-.0074		.4664	2,379
Wasatch 32	8,800	.3067	2,699	.2240	.1413	.0587	-.0239		.4001	3,521
Weber 48	148,000	.2406	35,609	.1579	.0753	-.0074			.2258	33,418
		Potential Use	340,379						Total Trips	555,982

TRAVEL COST VALUE: 555,982 trips x 40 miles (round trip distance for each added increment)/3.5 persons/vehicle x \$0.48 mile (a) (operating cost and value of travel time)/340,373 = \$8.96 per day

Formula:  $Y = 0.43894 - (.00413 \times \text{distance})$

$r^2 = .19$   $t = 2.038$

(a) The \$.48 per mile value is based on full wage value (for Salt Lake County) for adults, using an over time rate; and 1/12 hourly wage rate for children; no values for onsite time are included. This is estimated to be the appropriate value of travel time. Operating cost for a vehicle is estimated to be \$.164.

Table 8

Little Dell Lake Project  
Potential Recreation Use and Benefits

Year	Minimum Plan For Public Health and Safety	Moderate Level Plan	Staged Development Plan	Optimum Recreation Plan
Total Recreation Use (Including Winter-Use)				
1990	45,000 <u>1/</u>	350,000 <u>2/</u>	350,000 <u>3/</u>	437,000 <u>5/</u>
2000	45,000	350,000	550,000 <u>3/</u>	662,000
2010	45,000	350,000	887,000 <u>3/</u>	887,000
2020	45,000	350,000	980,000 <u>4/</u>	980,000 <u>4/</u>
2030	45,000	350,000	980,000	980,000
2040	45,000	350,000	980,000	980,000
2050	45,000	350,000	980,000	980,000
2060	45,000	350,000	980,000	980,000
2070	45,000	350,000	980,000	980,000
2080	45,000	350,000	980,000	980,000
2090	45,000	350,000	980,000	980,000
Annual Recreation Benefits				
3-1/4%	\$403,000	\$3,136,000	\$6,899,000	\$7,260,000
8-1/8%	\$403,000	\$3,136,000	\$5,400,000	\$6,020,000

1/ Based on capacity of facilities: 25,000 general recreation and 20,000 winter-use.

2/ Based on capacity of facilities: 330,000 general recreation and 20,000 winter-use.

3/ Limited by staged recreation development.

4/ Maximum practical use based on water and land area.

5/ Potential use limited by travel cost demand analysis.

Recreation use projected is within the practical use of the area and is consistent with current demands. Staged development was considered during the analysis; however, future recreation facilities were not included in the project economic evaluation, based on recreation development to accommodate 350,000 visitor days annually.

Summary of project benefits. - Project benefits have been summarized below for each project function at both the 3-1/4 and 8-1/8 percent interest rates.

PROJECT BENEFITS  
LITTLE DELL LAKE, UTAH

<u>Project Function</u>	<u>Project Benefits</u>	
	3-1/4%	8-1/8%
Flood Control	\$2,800,000	\$2,780,000
Water Supply	1,100,000	2,530,000
Recreation	<u>3,140,000</u>	<u>3,140,000</u>
Total	\$7,040,000	\$8,450,000

COST ANALYSIS

The estimate of first cost of the Little Dell Lake project is based on the detailed estimate of the Phase II GDM updated to 1983 price levels and reflecting scaled-down recreation development and the revised spillway design and associated modifications of the dam height and spillway described under Design and Preconstruction Considerations. The detailed estimate of the recommended plan is summarized in Table 9. The development of annual costs for the 3-1/4 and 8-1/8 percent interest rates is shown in Tables 10 and 11, respectively. The detailed first cost estimate is based on 1 October 1983

TABLE 9  
LITTLE DELL LAKE, UTAH  
SUMMARY OF FIRST COST  
OCT 1983 PRICES

Lands and Damages	\$ 3,620,000
Relocations	\$ 3,470,000
Roads	(2,940,000)
Utilities	( 530,000)
Reservoirs	270,000
Dams	\$58,640,000
Dam	(37,000,000)
Spillway	(3,500,000)
Outlet Works	(9,480,000)
Emigration Creek Diversion	(6,380,000)
Parleys Creek Diversion	(2,280,000)
Roads	840,000
Recreation Facilities	3,400,000 <sup>1/</sup>
Building, Grounds, and Utilities	680,000
Permanent Operating Equipment	330,000
Engineering and Design	5,410,000
Supervision and Administration	<u>4,770,000</u>
Total Dam and Reservoir	\$81,430,000

<sup>1/</sup> Includes resiting of Little Dell Pony Express Station, \$78,000, some of which may ultimately be a cultural resources cost.



TABLE 10

## LITTLE DELL LAKE, UTAH

ESTIMATE OF PROJECT ANNUAL COST AT 3-1/4%  
(1 Oct 1983 Price Level)INVESTMENT COST

First Cost	\$81,430,000
Market Value of Federal Lands Transferred to the Project	135,000
Interest During Construction <u>1/</u>	2,625,000
Gross (or net) Investment	\$84,190,000

ANNUAL COST

Interest 3-1/4 Percent	\$2,736,200
Adjustment for Loss of Land Productivity 3,620,000 x 0.0175	63,400
Amortization (100 yrs @ 0.00138)	116,200
Maintenance and Operation Dam and Reservoir	(176,200)
Recreation Facilities	(210,000)
Major Replacements	23,600
Total Annual Cost	\$3,325,600

Use	\$3,330,000
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1/ Compound Interest Based on Projected Construction Period

TABLE 11

## LITTLE DELL LAKE, UTAH

ESTIMATE OF PROJECT ANNUAL COST AT 8-1/8%  
(1 Oct 1983 Price Level)

INVESTMENT COST

First Cost	\$81,430,000
Market Value of Federal Lands	
Transferred to the Project	135,000
Interest During Construction <u>1/</u>	6,140,000
Gross (or net) Investment	\$87,705,000

ANNUAL COST

Interest 8-1/8 Percent	\$7,126,100
Adjustment for Loss of Land Productivity	-
Amortization (100 yrs @ 0.00004)	-
Maintenance and Operation	386,200
Dam and Reservoir	(176,200)
Recreation Facilities	(210,000)
Major Replacements	<u>5,600</u>
Total Annual Cost	\$7,521,400

Use \$7,520,000

1/ Compound Interest Based on Projected Construction Period

price levels. Land costs (including 20 percent contingency) are based on 1976 appraisals by the District's Real Estate Division. In general, unit prices for the major construction items are based on recent bids received for similar work in the Sacramento District, or based on bids received by the Bureau of Reclamation (USBR) for major contracts presently underway in Colorado and Utah. A 15 percent contingency allowance was used (1) to provide for possible change in quantities which could result after completion of detailed exploration work and final design and (2) to allow for highly fluctuating material and equipment prices. Suitable allowances have been included for engineering and design and supervision and administration based on costs experienced on similar projects in the Sacramento District and other Corps of Engineers districts.

Cost estimates for the single-purpose alternatives were based on semi-detailed design and quantities and were obtained by applying the same unit prices as used in the project estimate. Summary estimates are included under the cost allocation section for economic and cost allocation purposes. The total project first cost was adjusted to include the value of Federal lands and to exclude the costs associated with highway betterment. The adjustments include \$135,000 addition for Federal lands and the deduction of \$1,350,000 for highway betterments. Total economic first and annual costs for the project are tabulated below for 3-1/4 and 8-1/8 percent interest rates.

ECONOMIC FIRST AND ANNUAL COSTS  
LITTLE DELL LAKE, UTAH  
(October 1983 price levels)

	3-1/4%	8-1/8%
First Costs	\$80,215,000	\$80,215,000
Annual Costs	\$3,278,000	<del>\$7,520,000</del> 7,405,000

## BENEFIT-COST RATIO

A comparison of the estimated \$7,040,000 in annual benefits with the \$3,278,000 annual economic costs results in a benefit-cost ratio of 2.1 to 1, based on the project interest rate of 3-1/4 percent. Using the Fiscal Year 1984 interest rate of 8-1/8 percent, the project benefits would total \$8,450,000 annually, including \$2,780,000 for flood control, \$2,530,000 for water supply, and \$3,140,000 for recreation. Annual economic cost would be \$7,405,000, after deducting \$115,000 annually for betterments to Highway 65. The benefit-cost ratio would be 1.1 to 1 for the selected plan at the current planning interest rate of 8-1/8 percent.

## COST ALLOCATION UPDATE

General - A new cost allocation has been developed based on the present design and October 1983 price level update of costs and benefits, using the separable costs-remaining benefits method.

The following subparagraphs summarize the supporting data used in allocating costs of the project to each function. Estimates of costs of alternative single-purpose projects, separable costs associated with the multiple-purpose project, joint costs, and cost allocations are shown in the following subparagraphs:

Alternative Single-Purpose Projects. - Table 12 summarizes pertinent data for the multiple-purpose project and alternative single-purpose projects. The least costly alternative flood control project is a 30,000 acre-foot reservoir at the Little Dell site. The 30,000 acre-foot reservoir would include 3,000 acre-feet for sediment and inactive storage and 27,000 acre-feet for flood control. Diversion facilities from Emigration Creek and Parleys Creek would be required; recreation land and facilities would not be required. Estimated costs of single-purpose alternatives are shown in Table 13, based on 3-1/4 percent interest rate.



TABLE 12

LITTLE DELL LAKE PROJECT  
COST ALLOCATION STUDIES  
PERTINENT DATA

Item	:	Unit	:	Alternative Single-Purpose Project			
				Multiple-Purpose	Flood Control	Water Supply	Recreation
<u>General</u>							
Location				Little Dell Site	Little Dell Site	Argenta Site Big Cottonwood Creek	Little Dell Site
Diversions				Emigration Creek Parleys Creek	Emigration Creek Parleys Creek		
Reservoir							
Total Capacity		Acre-Feet		30,000	30,000	30,000 (a)	4,000
Dead and Inactive Pool		Acre-Feet		3,000	3,000	3,000	4,000
Dam							
Type		Ft. msl		Rolled Earthfill	Rolled Earthfill	Rolled Earthfill	Rolled Earthfill
Elevation Top Dam		Ft.		5,842	5,842	7,348	5,729.5
Height				253	253	308	140.5
Spillway				Uncontrolled	(b)	(b)	(b)
Outlet				Gate Controlled, Reinforced Concrete Tunnel	(b)	Valve Controlled	(b)
Diversions							
Emigration Creek				7'0" Circular Tunnel - 1.03 miles	(b)	None	(b)
Parleya Creek				4' Concrete Pipe 3.1 Miles	(b)	None	(b)
Recreation Lands Facilities		Acres		290 Projected Related Facilities	None	Mitigation Only	290
					None	Mitigation Measures Only	(b)

(a) 30,000 acre-foot capacity represents an economical scale of development. The yield would be 10,700 acre-feet per year compared to 5,500 acre-feet from the Little Dell multiple-purpose project.

(b) Same as multiple-purpose project.

Table 13

SUMMARY OF COSTS OF SINGLE-PURPOSE ALTERNATIVES  
 1 October 1983 Price Level  
 3-1/4 Percent Interest Rate  
 (Values in \$1,000)

	:	:	:
	Flood Control	Water Supply	Recreation
Damsite	Little Dell	Argenta	Little Dell
Reservoir capacity (1,000 acre-feet)	30	30	4
TOTAL PROJECT FIRST COST	76,105 (a)	53,880	30,985
<u>Investment (Total Project)</u>			
First Cost	76,105	53,880	30,985
Interest During Construction	<u>2,445</u>	<u>1,420</u>	<u>1,015</u>
TOTAL PROJECT INVESTMENT	78,550	55,300	32,000
<u>Project Annual Costs</u>			
Interest and Amortization	2,661	1,873	1,084
Adj. for Net Loss in Land Productivity	60	78	23
Maintenance and Operation	172	150	343
Major Replacement	<u>24</u>	<u>24</u>	<u>24</u>
TOTAL PROJECT ANNUAL COST	2,917	2,125	1,474

(a) Includes \$135,000 estimated value of required Federal land and excludes \$1,350,000 for Highway 65 betterment.

First and annual economic costs for the single-purpose flood control plan are as follows.

First Cost \$76,105,000  
Average Annual Cost \$2,917,000

The most viable single-purpose M&I alternative would be development of storage at the Argenta site on Big Cottonwood Creek, comprising a 30,000-acre-foot reservoir with a yield of 10,700 acre-feet per year. The first cost of the development was estimated at \$53,880,000 and the investment cost at \$55,300,000. Annual cost based on a 100-year economic life and the 3-1/4 percent project interest rate would amount to \$2,125,000. The annual water supply single-purpose cost was established at \$1,100,000 by applying the \$200 per acre-foot cost to the 5,500 acre-feet of firm increased yield from the Little Dell Lake project.

Based on the surface area needed to support the planned level of use, it was determined that a reservoir at the Little Dell site having a capacity of 4,000 acre-feet is the most economical single-purpose alternative recreation project. The plan would require the same recreation facilities as the multiple-purpose plan to provide recreational benefits equivalent to those provided under the project plan. First and annual economic costs based on 3-1/4 percent interest rate are shown in Table 13 and summarized below:

First Cost \$30,985,000  
Average Annual Cost \$1,474,000

LITTLE DELL LAKE PROJECT  
SUMMARY OF MULTIPLE-PURPOSE PROJECT COST  
AND MULTIPLE-PURPOSE PROJECT COST MINUS ONE FUNCTION  
1 October 1983 Price Level - 3-1/4% Interest Rate  
(Values in \$1,000)

(a) Includes \$135,000, the estimated value of required Federal Lands and excludes \$1,350,000 for Highway 65 betterment.



Separable Costs. - If flood control were omitted from the project, a reservoir of 29,000 acre-feet, reflecting deletion of the 1,000 acre-foot permanent flood control reservation, and the diversion facilities are required to serve the conservation and recreation needs. The need for permanent operating equipment and operation and maintenance costs would be reduced. The first and annual costs for a project without flood control are shown in Table 14 and are summarized below:

First Cost - \$78,865,000

Annual Cost - \$3,201,000

The reductions in cost, which are the separable and specific costs chargeable to flood control, are as follows:

First Cost      \$80,215,000 - \$78,865,000      = \$1,350,000

Annual Cost      \$3,278,000 - \$3,201,000      =     \$77,000

If the municipal water supply function were omitted from the project, a reservoir of 30,000 acre-feet and the diversion facilities would still be required to serve the flood control and recreation purposes. First costs of the multiple-purpose project and the project with water supply omitted are the same; however, there is \$30,000 in separable OM&R costs for the water supply function.

If the recreation function were omitted from the project, a 30,000 acre-foot reservoir and the diversion facilities are required to serve the flood control and water supply functions. Recreation lands and facilities would not be required. Accordingly, the specific recreation cost is also the separable cost. First and annual costs of such a project are shown in Table 14 and are summarized as follows:

First Cost - \$76,105,000

Annual Cost - \$2,917,000

The reduction in cost, which is a separable and specific cost chargeable to recreation, is as follows:

$$\begin{array}{lcl} \text{First Cost} & \$80,215,000 - \$76,105,000 & = \$4,110,000 \\ \text{Annual Cost} & \$3,278,000 - \$2,917,000 & = \$361,000 \end{array}$$

Joint Cost. - Joint cost is the difference between the cost of the multiple-purpose project and the sum of the separable costs. The joint costs would be:

$$\begin{array}{lcl} \text{First Cost} & \$80,215,000 - \$1,350,000 - \$4,110,000 & = \$74,755,000 \\ \text{Annual Cost} & \$3,278,000 - \$77,000 - \$30,000 - \$361,000 & = \$2,810,000 \end{array}$$

Table 15 displays a summary of the separable costs, joint use cost, and total project cost.

TABLE 15

LITTLE DELL LAKE PROJECT  
SUMMARY OF SEPARABLE AND JOINT USE COSTS  
1 October 1983 Price Level  
(Values in \$1,000)

	: Separable Costs			: Joint		: Total
	: Flood	: Water	:	: Use	:	
	: Control	: Supply	: Recreation	: Cost	: Cost	
TOTAL PROJECT FIRST COST	1,350	0	4,110	74,755		80,215
Investment (Total Project)						
First Cost	1,350	0	4,110	74,755		80,215
Interest During Construction	45	0	130	2,410		2,585
TOTAL PROJECT INVESTMENT	1,395	0	4,240	77,165		82,800
Project Annual Costs						
Interest and Amortization	47	0	144	2,614		2,805
Adjustment for Net Loss of Land Productivity	0	0	3	60		63
Maintenance and Operation	30	30	214	112		386
Dam and Reservoir Recreation			(214)	(172)		(172)
Major Replacement	0	0	0	24		(214)
Dam and Reservoir Recreation	--	--	--	(24)		24
						(24)
TOTAL PROJECT ANNUAL COSTS	77	30	361	2,810		3,278

Allocated Costs. - A preliminary allocation of project costs was made by the separable costs-remaining benefits method of allocation. A summary of the cost allocation data, including pertinent data, costs associated with the alternative single-purpose projects separable costs, and joint use costs, is included in Tables 12 through 15. The cost allocation is shown in Table 16. The allocated first costs for the various project purposes are shown in the following tabulation:

Function	Specific Costs (\$1,000)	Joint-Use Costs (\$1,000)	Percent Joint-Use	Total Cost (\$1,000)
Flood Control	1,350	41,515	55.6	42,865
M&I Water Supply	0	16,320	21.8	16,320
Recreation	<u>4,110</u>	<u>16,920</u>	<u>22.6</u>	<u>21,030</u>
Total	5,460	74,755	100.0	80,215

The allocation of annual operation, maintenance, and replacement costs is shown in the following tabulation:

Function	Specific Costs (\$1,000)	Joint-Use Costs (\$1,000)	Percent Joint-Use	Total Cost (\$1,000)
Flood Control	30	75	55.2	105
M&I Water Supply	30	29	21.3	59
Recreation	<u>214</u>	<u>32</u>	<u>23.5</u>	<u>246</u>
Total	274	136	100.0	410



TABLE 16  
LITTLE DELL LAKE PROJECT  
COST ALLOCATION  
(Values in \$1,000)

Item	Flood Control	Water Supply	Recreation	Total
1. Allocation of annual costs				
a. Annual benefits	2,800	1,100	3,140	7,040
b. Alternative annual costs	2,917	1,100	1,474	5,491
c. Annual benefits limited by annual costs	2,800	1,100	1,474	5,374
d. Separable annual costs	77	30	361	468
e. Remaining annual benefits	2,723	1,070	1,113	4,906
f. Allocated joint annual costs	1,560	613	637	2,810
g. Total allocated economic costs	1,637	643	998	3,278
h. Adjustment for net loss of land productivity	33	13	17	63
i. Total allocated project costs	1,604	630	981	3,215
2. Allocation of O&M				
a. Separable annual costs	30	30	214	274
b. Allocated joint costs	62	24	26	112
c. Total allocation O&M	92	54	240	386
d. Specific costs	0	0	0	0
e. Allocated joint use costs	0	0	0	0
f. Percent of joint use O&M costs	55.4	21.4	23.2	100
3. Allocation of major replacement				
a. Separable cost	0	0	0	0
b. Allocated joint cost	13	5	6	24
c. Total allocation, major replacement	13	5	6	24
d. Percent of joint use, major replacement	54.2	20.8	25.0	100
4. Total allocated OM&R				
a. Allocated OM&R costs	105	59	246	410
b. Percent of OM&R costs	25.6	14.4	60.0	100
c. Allocated joint use	75	29	32	136
d. Percent of joint use	55.2	21.3	23.5	100
5. Allocation of investment				
a. Annual investment cost (Interest and amortization)	1,499	571	735	2,805
b. Allocated investment	44,250	16,850	21,700	82,800
6. Allocation of first cost				
a. Specific investment	1,395	0	4,240	5,635
b. Investment in joint use facilities	42,855	16,850	17,460	77,165
c. Interest during construction on joint use facilities	1,340	530	540	2,410
d. First cost of joint use facilities	41,515	16,320	16,920	74,755
e. Percent of first cost in joint use facilities	55.6	21.8	22.6	100
f. First cost of specific facilities	1,350	0	4,110	5,460
g. Total first cost	42,865	16,320	21,030	80,215
h. Percent of first cost	53.4	20.4	26.2	100

## LOCAL COOPERATION

### LOCAL SUPPORT

Local support has remained firm during the feasibility and advanced engineering and design stages of the project. The Utah Congressional delegation unitedly supports the project; the State of Utah, including the Governor and the Utah Division of Water Resources Board, also supports the project; major local support is vested in Salt Lake County and Salt Lake City. In 1974, project sponsors approved draft contracts for repayment and confirmed by letter their intent to provide the necessary requirements of local cooperation. The project sponsors are shown below.

<u>Project Function</u>	<u>Potential Sponsor</u>
Flood Control	Salt Lake County
Recreation	Salt Lake County
Water Supply	Metropolitan Water District of Salt Lake City

The project sponsors reaffirmed their support for the project by letter of 1978.

During late 1980 and in 1981, support for the project intensified, primarily based on the urgent need for water supply. It was apparent that water supply from the Bonneville Unit of the Central Utah Project would not be available until some time in the 1990's and that construction of Little Dell Lake project should be expedited to meet the expected interim demand. In 1981 resolutions were passed by Salt Lake City, Salt Lake County, and the Utah Board of Water Resources endorsing the project and urging Congressional funding. In 1982 Congress authorized the Office Study, which was completed in October 1982. Subsequent to the Office Study, efforts were renewed to obtain construction funding. The flood of 1983 resulted in amplified support for the project. By letters of June 1983 to the Utah Congressional delegation and the Assistant Secretary of the Army, local interests urged construction funding and expressed a willingness to provide upfront financing of \$22 million. For Fiscal Year 1984, Congress appropriated \$400,000 for continued planning studies.

On 22 November 1983, Colonel Arthur E. Williams, Sacramento District Engineer, represented the Assistant Secretary of the Army at a field inspection and meeting in Salt Lake City. Mayor Ted Wilson of Salt Lake City and Commissioner Shimizu of Salt Lake County testified that the project was urgently needed to provide protection to the 1300 South Stream Group flood plain. Both expressed the views that the project was well justified for flood control and that had it been in place in the spring of 1983, the 1300 South Street open floodway would not have been necessary and flood damage would have been greatly reduced. They expressed concern that the area is subject to a disastrous flood threat which Little Dell would relieve. The local project sponsors expressed willingness to discuss proposed revised cost sharing. They reported that water supply upfront financing had tentatively been arranged through the Central Utah Water Conservancy District.

Local interests continue to support recreation development at the project as an opportunity to meet recreation demands in close proximity to Utah's population center. Concern has been expressed over the level of recreation development and the potential impact on esthetics of the area. Local interests have also been concerned with the local costs associated with the recreation development and particularly the increased costs associated with recreation cost-sharing criteria being used in considering new construction starts. In recognition of these concerns, Sacramento District, subsequent to the 1982 Office Study, developed a preliminary scaled-down recreation alternative. Local interests reviewed the scaled-down alternative during early 1983, and on 7 June 1983 the Salt Lake County recreation staff drafted summary conclusions and made recommendations to the county commission that the scaled-down recreation alternative features appeared consistent with local needs. By letter of 10 January 1984 from the county commission administrative assistant, Sacramento District was officially requested to include scaled-down recreation in current analysis and recommendations to the Administration (see attachment 3).



The Utah Congressional delegation, at the request of local interests, continues to seek a way to obtain Congressional appropriations to initiate construction of the project.

Costs to local interest have been summarized below based on October 1983 price levels.

#### FLOOD CONTROL COST SHARING

Since flood damages alleviated by the project are principally in Salt Lake City, requirements of local cooperation for flood control are as required for a local protection project. Specifically, these include the costs of lands, easements, rights-of-way, and relocations allocated to the flood control function and include all annual operation, maintenance, and replacement costs associated with flood control. Current estimates of joint use lands are \$3,545,000 after deducting \$210,000 for specific recreation lands and adding \$135,000 as the estimated value of Federal land transferred to the project. Relocation costs subject to local participation are estimated at \$2,620,000 based on relocation cost of \$3,970,000, reduced by \$1,350,000 for highway betterment, which is a Federal cost. Total lands and relocation costs subject to flood control cost sharing total \$6,065,000. Based on the flood control allocations of 55.6 percent, the local flood control first costs are estimated at \$3,370,000. Local annual flood control operation and maintenance costs are currently estimated at \$105,000.

#### MUNICIPAL WATER REPAYMENT

The cost of Little Dell Lake project allocated to water supply is authorized to be repaid to the United States by the Metropolitan Water District of Salt Lake City in accordance with the Water Supply Act of 1958. Based on the current cost allocation, costs subject to repayment by local interests were determined and are summarized below, along with the estimated



annual cost over a 50-year period at the FY 1984, 10.403 percent repayment interest rate. The total cost allocated to the water supply function amounts to 21.8 percent of the total joint cost.

First Cost	\$16,320,000
Investment Cost	\$16,850,000
OM&R Costs	\$ 59,000
Annual Repayment of Investment	\$ 1,765,000
Total Annual Cost	\$ 1,824,000
Cost Per Acre-Foot of Yield	\$ 330

#### RECREATION COST SHARING

In accordance with provisions of PL 89-72 and the authorizing document, local interests are required to bear one-half the separable cost allocated to recreation. In addition, local interests must bear the annual operation, maintenance, and replacement costs specifically associated with the recreation function. Separable recreation costs are currently estimated to total \$4,110,000 including \$210,000 for lands and \$3,900,000 for facilities. The local interest share of the recreation cost would be \$2,055,500. Annual operating costs to be assumed by local interests are currently estimated at about \$214,000. Annual repayment based on the current repayment rate of 10.403 percent, would total about \$215,000 for a 50-year repayment period.

#### CURRENT COST-SHARING POLICY

Cost-sharing criteria currently used for budgetary purposes require increased participation by local interests and upfront financing. In support of initiating construction, the Salt Lake County Commission on 15 June 1983 passed a resolution supporting the project and committing funds in the amount of \$22,000,000 as "upfront" money. By letter of 21 June 1983 the Director, Utah Division of Water Resources, forwarded a letter to Assistant Secretary of Army supporting the project and upfront financing in the amount of

\$22,000,000. The offer would provide 100 percent of the traditional cost-sharing requirement but falls short of current budgetary cost-sharing requirements. Current criteria are summarized below.

#### CURRENTLY PROPOSED COST-SHARING CRITERIA

Flood Control	35 percent of the cost allocated to flood control
Water Supply	100 percent of the project cost allocated to water supply, all upfront and concurrent with construction
Recreation	50 percent of the project cost allocated to recreation, all upfront and concurrent with construction

#### COST-SHARING COMPARISON

A comparison of the local costs associated with traditional and currently proposed cost-sharing criteria has been developed for the modified plan reflecting the scaled-down recreation development and also showing the effects of eliminating recreation as a project purpose.

#### LOCAL INTEREST COSTS LITTLE DELL LAKE, UTAH

Project Purpose	Traditional Cost Sharing (First Costs)		Current Policy Cost Sharing (First Costs)	
	With Recreation	Without Recreation	With Recreation	Without Recreation
Flood Control	\$ 3,370,000	\$ 4,355,000	\$15,000,000	\$19,260,000
Water Supply	16,320,000	\$21,080,000	16,320,000	21,080,000
Recreation	<u>2,055,000</u>	<u>0</u>	<u>10,515,000</u>	<u>0</u>
TOTAL	\$21,745,000	\$25,435,000	\$41,835,000	\$40,340,000
TOTAL FIRST COSTS	\$81,430,000	\$77,320,000	\$81,430,000	\$77,320,000
LOCAL INTEREST COST-PERCENT OF FIRST COSTS	26.7	32.9	51.4	52.1

Under traditional cost sharing, local interests are expected to assume all OM&R costs with exception of the joint O&M costs allocated to recreation. Under the current policy for cost sharing, the joint O&M cost allocated to recreation would also be a local responsibility. Omission of the recreation function would eliminate OM&R costs of \$214,000 annually.

#### SCHEDULING OF CONSTRUCTION

The construction schedule was developed and included in the Phase II GDM. The time required for construction has been reviewed and the sequence and time required have been verified. The construction schedule narration and chart from the GDM have been included as attachment 4. An update of the construction funding based on October 1983 price levels is shown below.

#### Little Dell Lake, Utah Estimated Expenditure Schedule

October 1983

<u>Fiscal Year</u>	<u>Prices &amp; Conditions 1/</u>
Thru FY 84	\$2,505,000
FY 1 Construction Start	7,420,000
FY 2	7,580,000
FY 3	13,040,000
FY 4	24,510,000
FY 5	23,730,000
FY 6	<u>2,645,000</u>
Total	81,430,000

1/ No adjustment for future inflation during construction

Subsequent to acceptance of this report, appropriate cost sharing will need to be determined and coordinated with the local project sponsors. Prior draft contracts included in the Phase I GDM may need to be revised to reflect updated formats in accordance with Principles and Guidelines and updated project data contained in this report. These contracts will need to be executed prior to initiation of construction or acquisition of project lands.

## CONCLUSIONS

Reexamination of the Little Dell Lake project reaffirms the need, support, and timing of project functions; the compatibility and effectiveness of the proposed coordination of the project; and the economic feasibility of the project. Analysis of current needs and design requirements necessitated modifications to the spillway and dam height to accommodate a larger spillway design flood and a reduction in the recreation development for consistency with present recreation demands and the desires of local interests. These changes have been incorporated into the reexamination. Major components and conclusions of the reexamination are summarized below:

### Flood Control Analysis

- Recent hydrology is within the confidence limits of the hydrology data base.
- The 1983 flood could have been controlled by the project facilities in accordance with the established operating criteria.
- Flood damage data previously developed remain applicable in light of the 1983 flood.

### Water Supply Analysis

- Water supply is urgently needed by 1990 to avoid serious water shortages.
- The water supply function is consistent with other potential water developments and has the support of all major water supply interests in the area.
- Water supply operations would not adversely affect flood control operations.
- The infrequency of total drawdown for water supply reduces potential impacts on recreation.



- The single-purpose water supply alternative developed in the 1982 Office Study remains valid.

#### Recreation Analysis

- Recreation has been scaled back to meet present demands and to be consistent with desires of local interests.
- The scaled-back recreation development would accommodate 350,000 visitors per year in comparison to 960,000 visitors used in the general design memorandums.
- Local interests could expand recreation facilities in the future as appropriate to keep pace with growing demands.
- Total deletion of recreation would not affect economic feasibility at the 3-1/4 percent interest rate but would impact on economic feasibility at the 8-1/8 percent interest rate.
- Deletion of recreation would increase local interest costs to the other project purposes.

#### Benefit Analysis

- Benefit analysis developed previously is essentially in accordance with Principles and Guidelines.
- Recreation use and benefits have been adopted based on the travel cost methodology prescribed in Principles and Guidelines.

#### Cost Analysis

- Project costs have been modified to reflect spillway and associated modifications and the scaled-back recreation development.

### Benefit-Cost Analysis

- The economic feasibility of the project has been reaffirmed for both the authorized 3-1/4 percent and the current 8-1/8 percent interest rates.
- The benefit-cost ratios are 2.1 and 1.1, respectively, for the reexamination at 3-1/4 and 8-1/8 percent interest rates.
- Deletion of recreation would reduce the benefit-cost ratios to 1.5 and 0.8, respectively, for the 3-1/4 and 8-1/8 percent interest rates.

### Cost Allocation

- Cost allocation, reflecting the reexamination, resulted in 53.4 percent of the first cost being allocated to flood control, 20.4 percent to water supply, and 26.2 percent to recreation.

### Comparative Local Cooperation Requirements

- Local interests costs, based on traditional cost sharing, would total \$21,745,000, as compared with \$41,835,000 for the current cost-sharing policy.
- Deletion of the recreation function would result in non-Federal costs of \$25,435,000 and \$40,340,000, respectively, for traditional and current cost-sharing.
- Local interests have offered \$22 million as upfront local financing.

### Scheduling of Construction

- The 6-year construction schedule outlined in the Phase II General Design Memorandum remains valid.

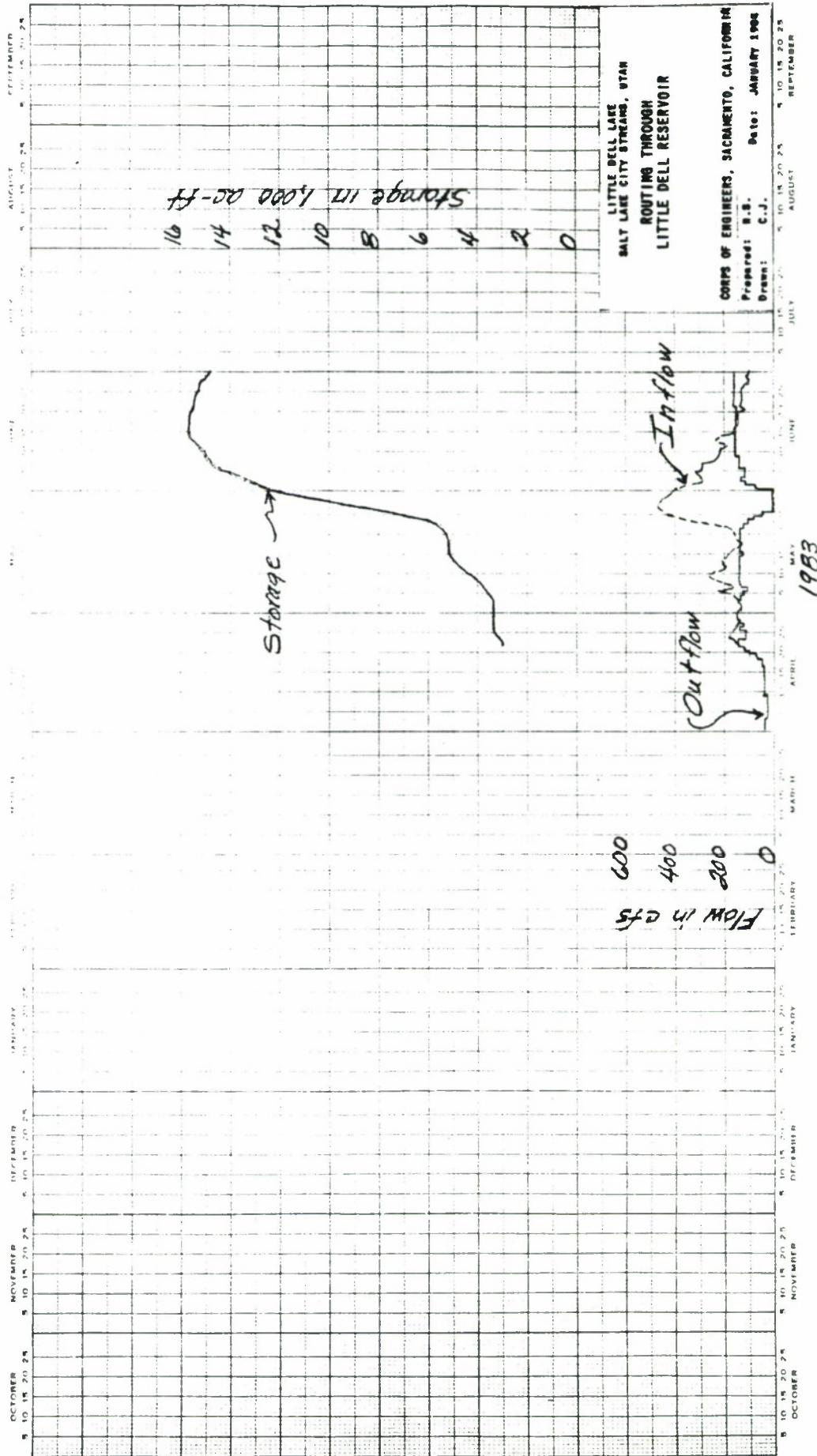
- Draft repayment contracts need to be updated and executed prior to initiation of project construction or land acquisition.

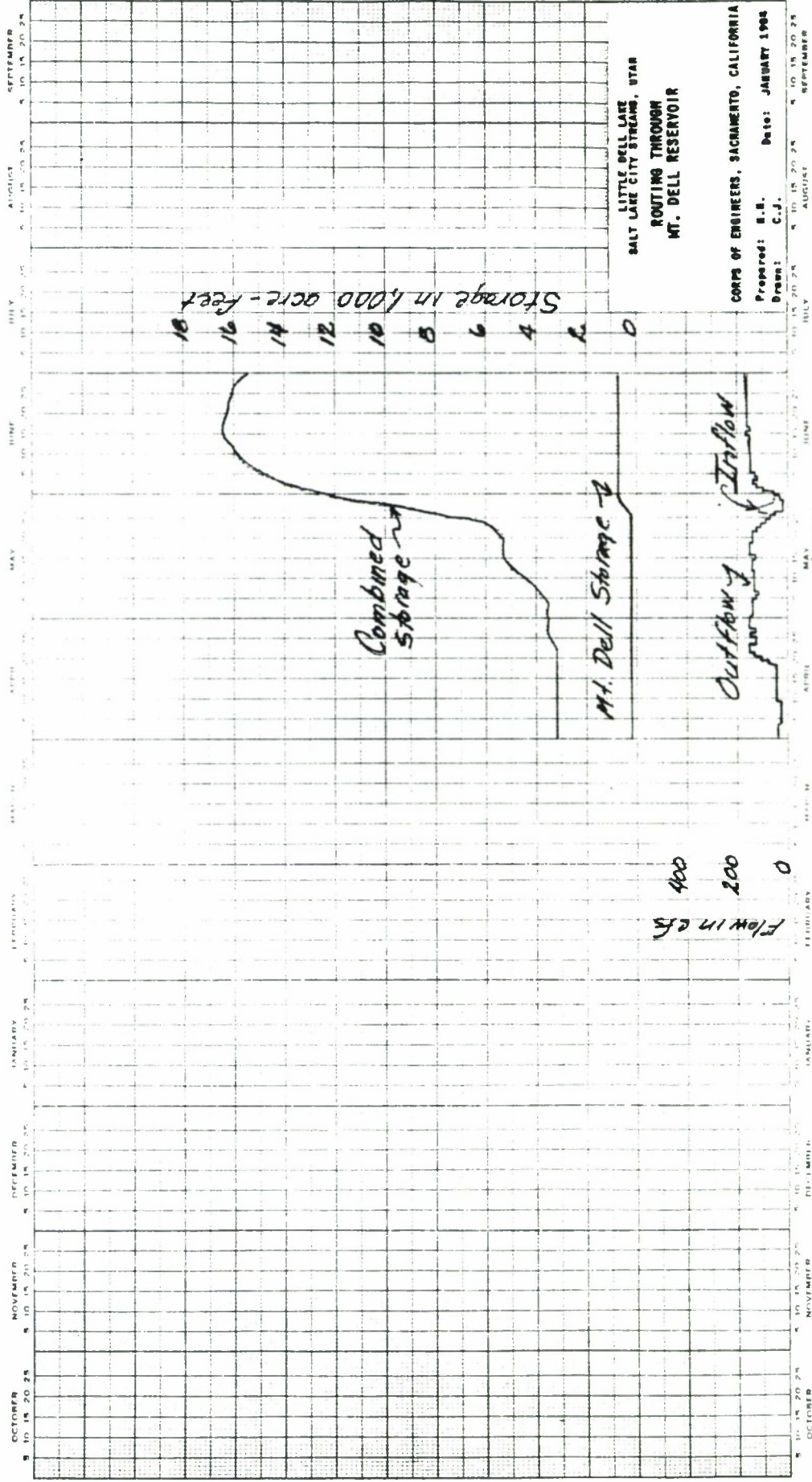
- FY-1984 appropriations are adequate to make necessary modifications to plans and specifications in support of the first construction season.

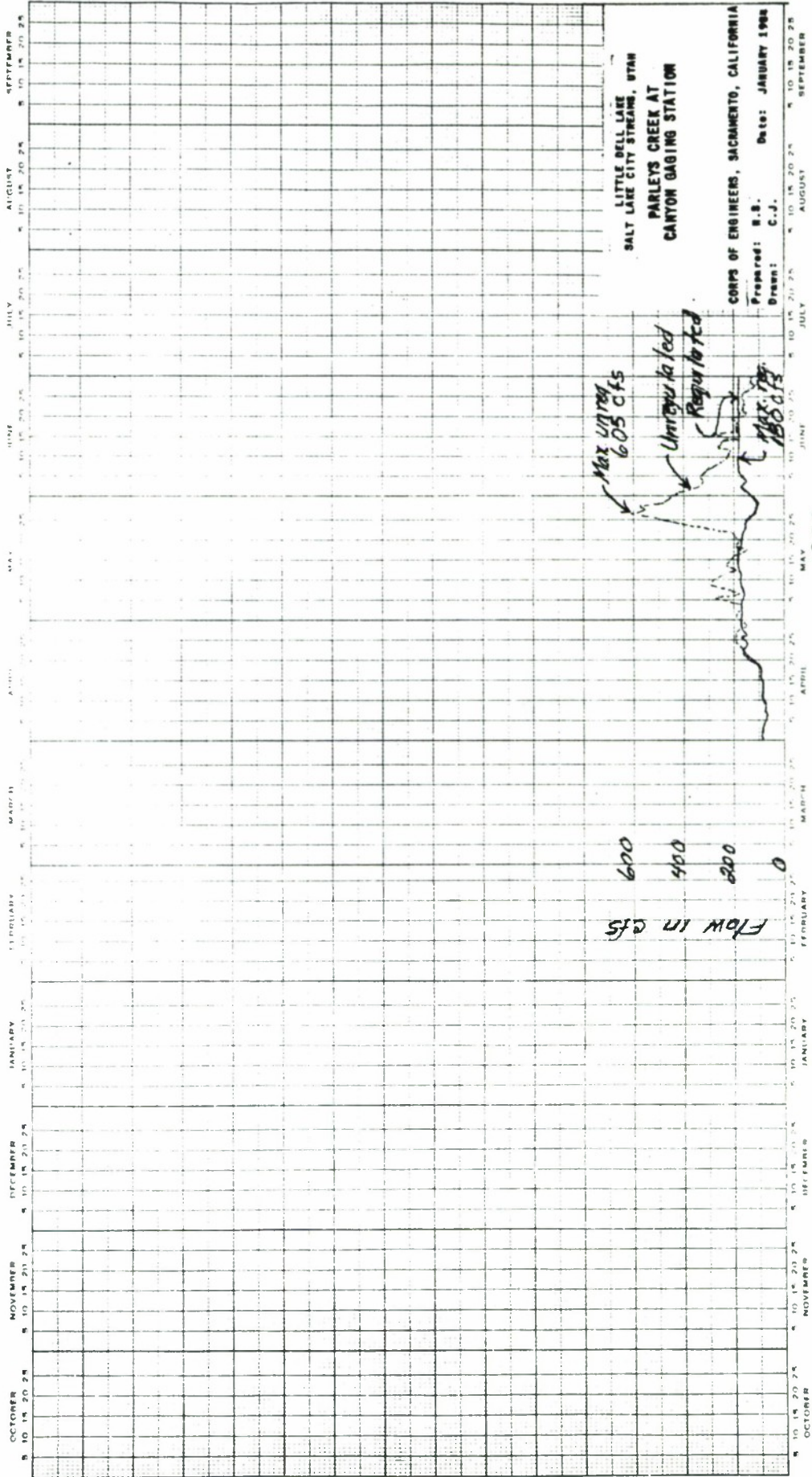


CHARTS  
AND  
ATTACHMENTS

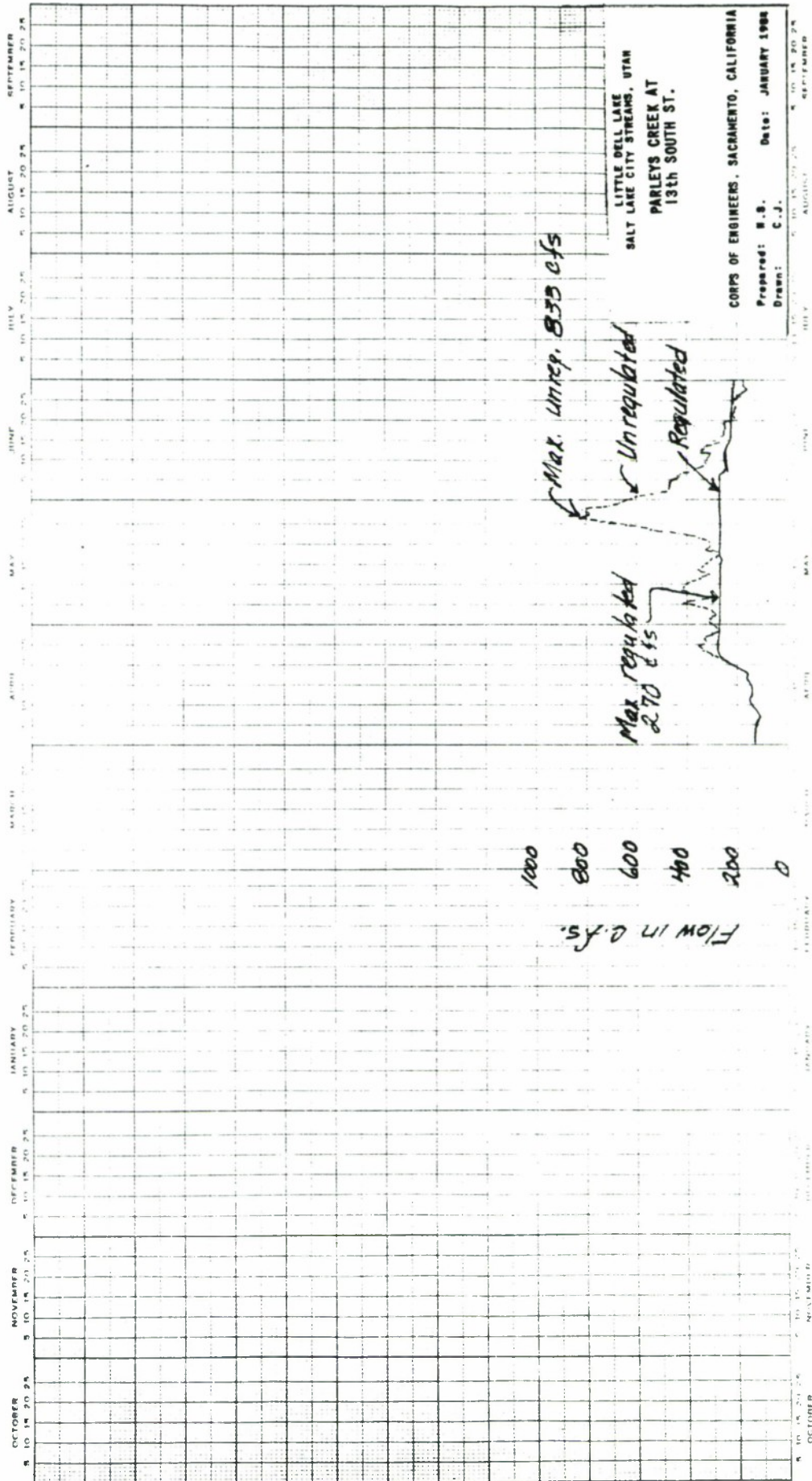




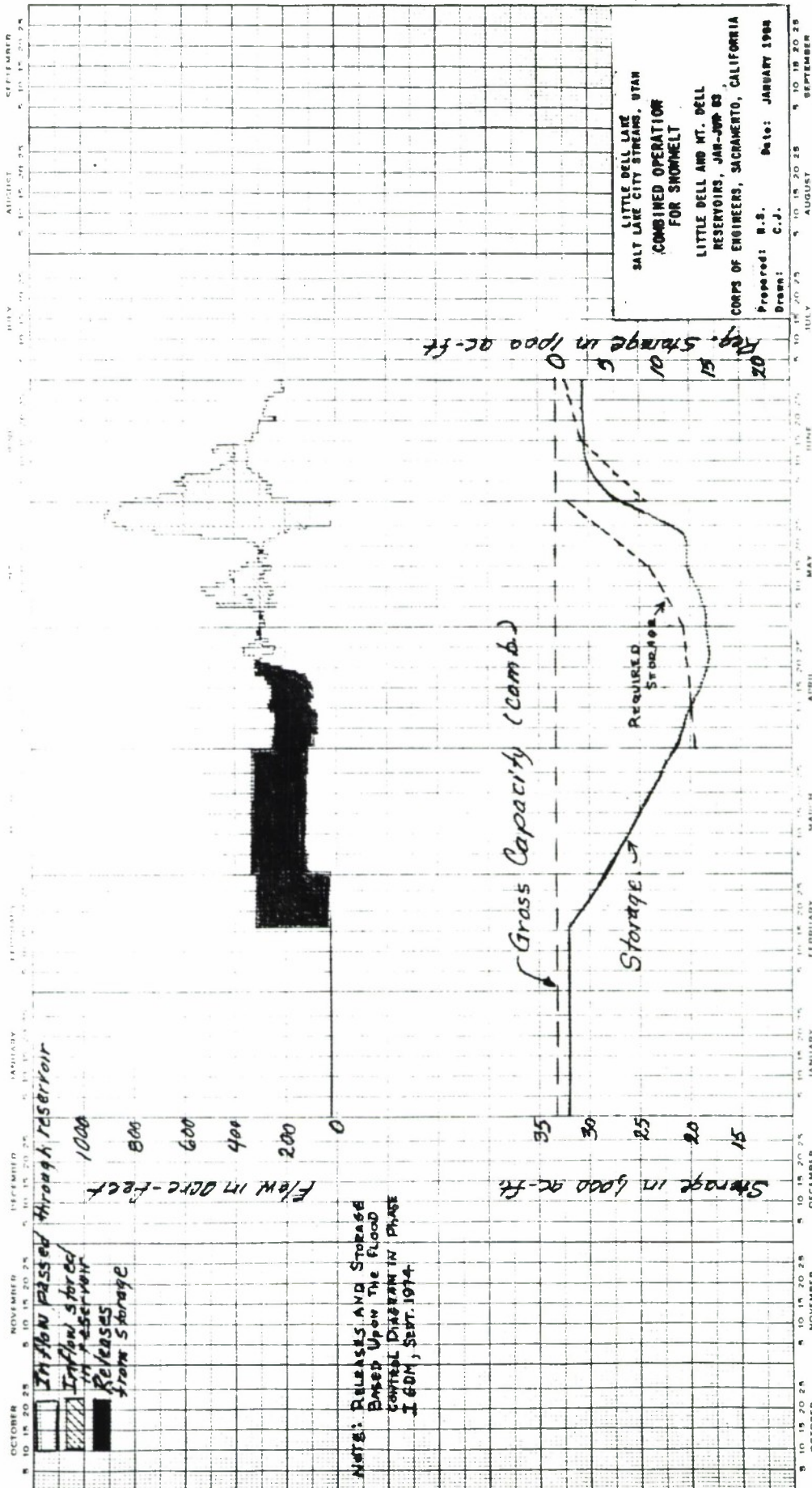


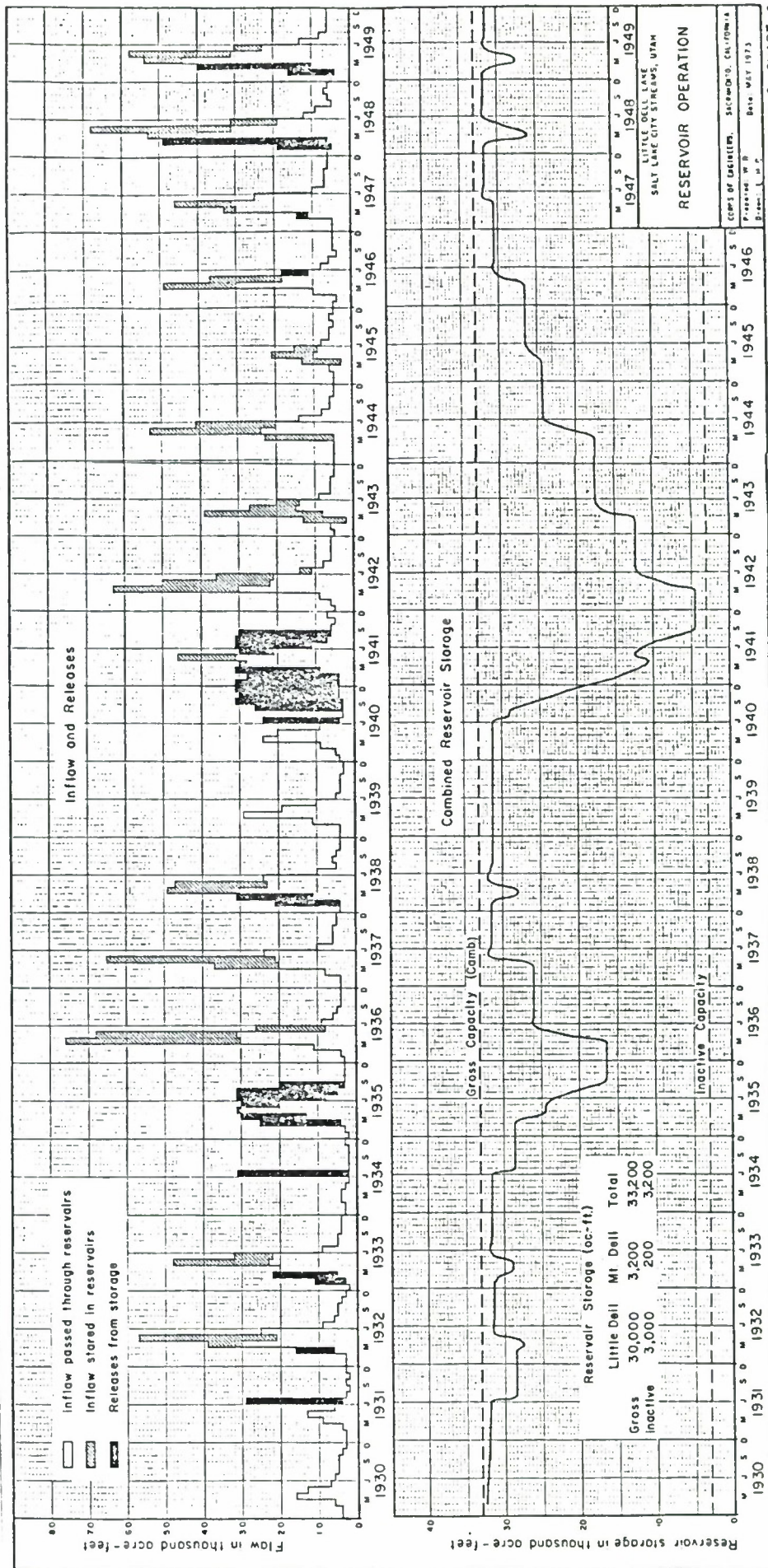




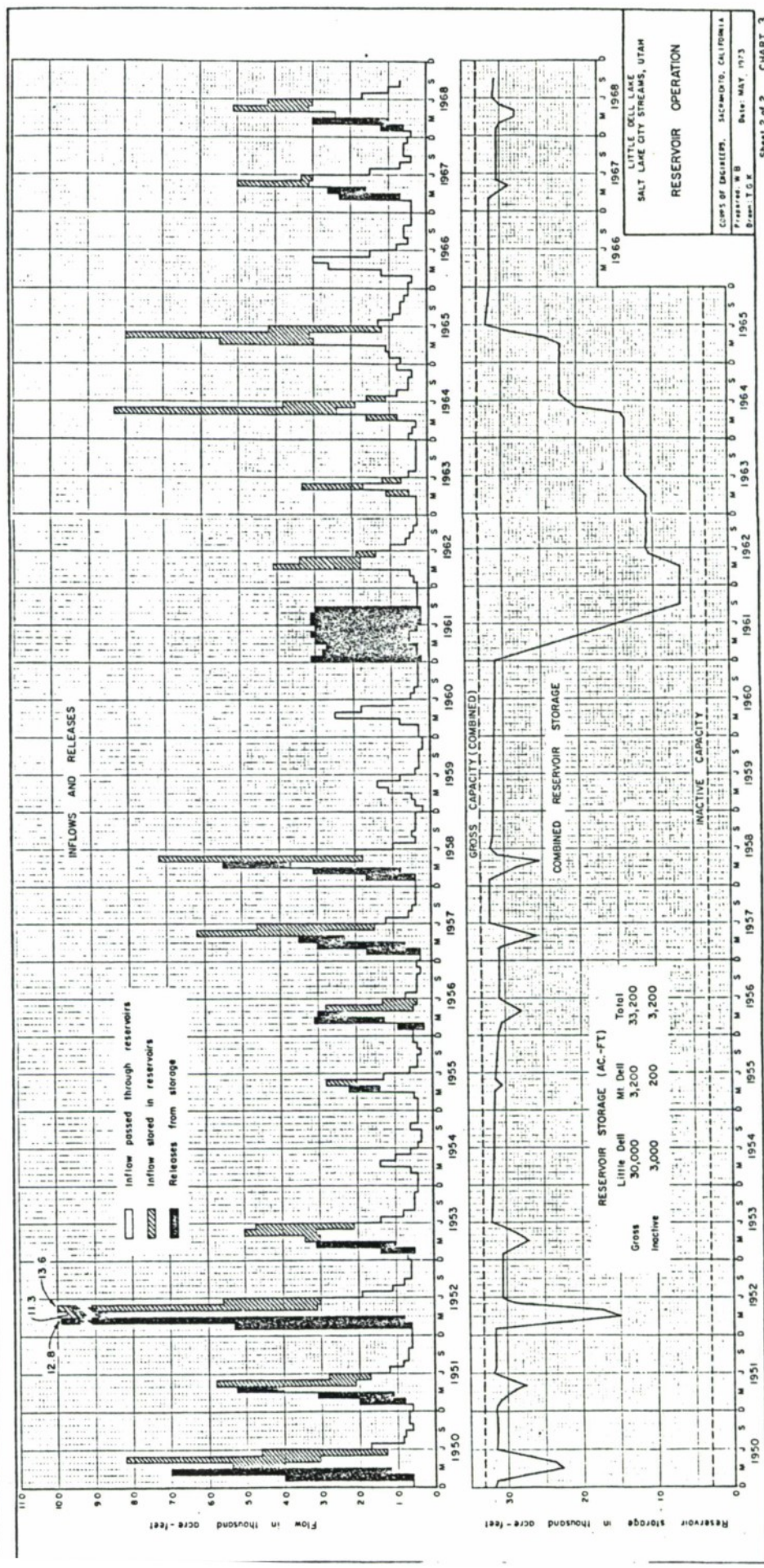




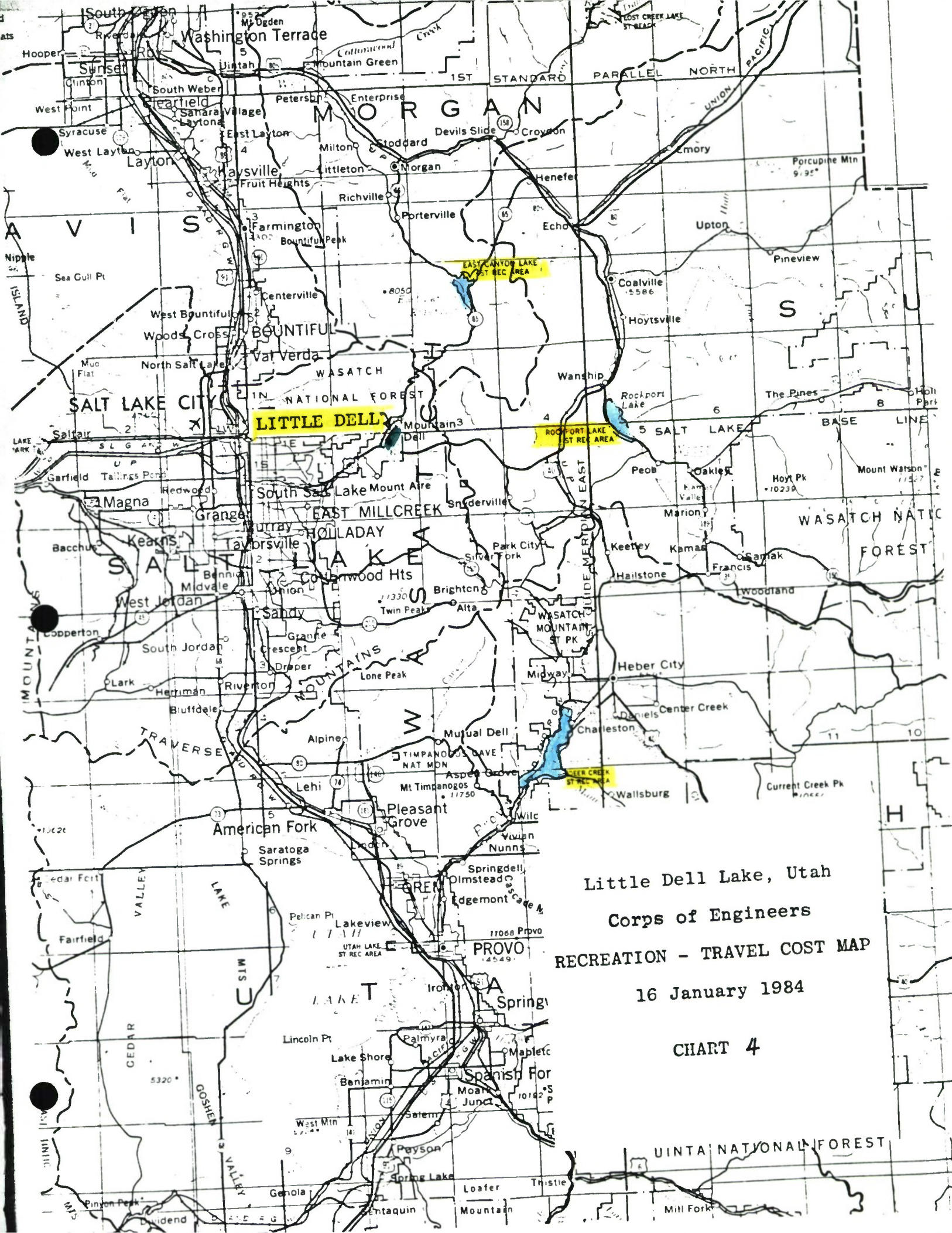










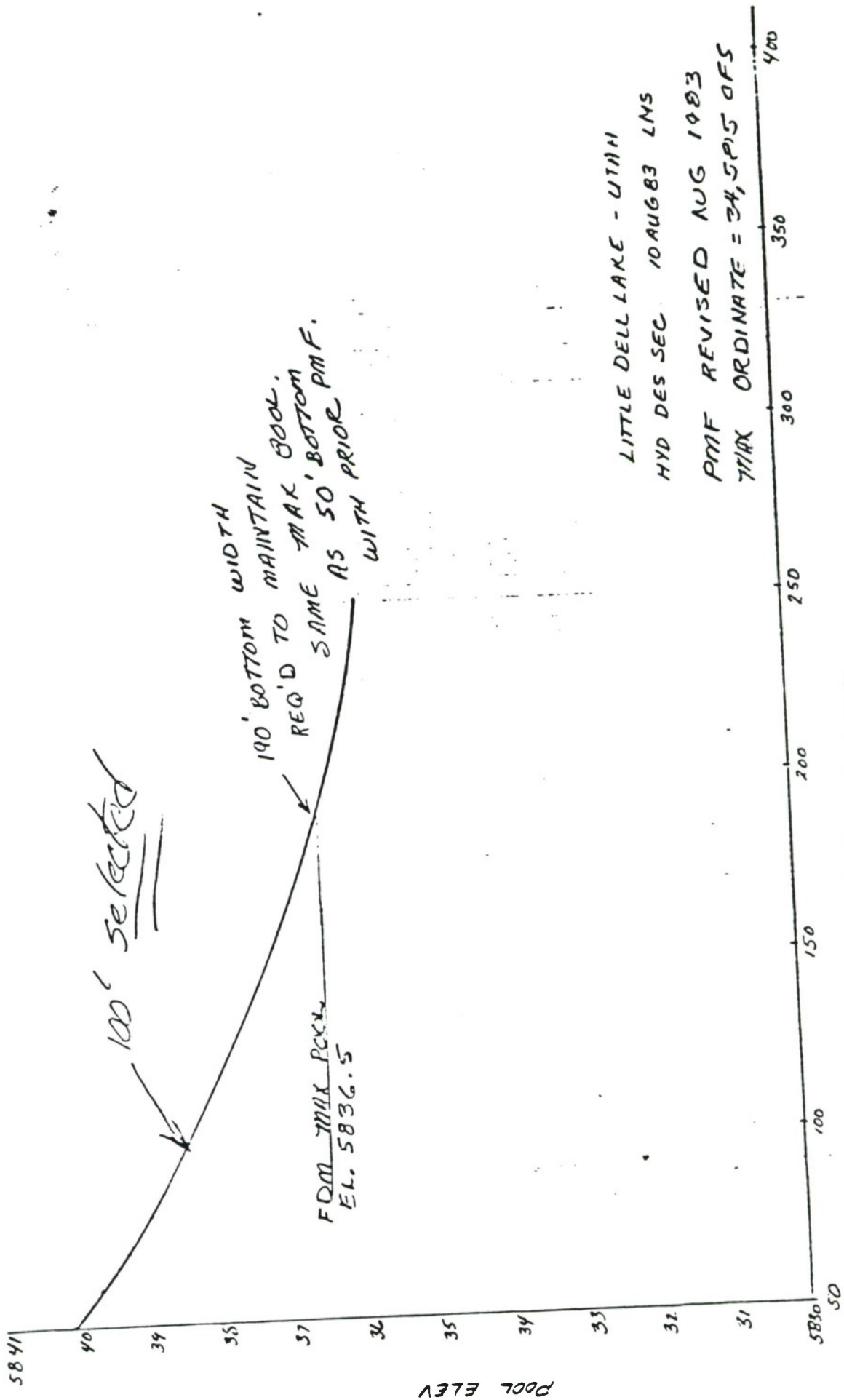


Little Dell Lake, Utah  
Corps of Engineers  
RECREATION - TRAVEL COST MAP  
16 January 1984

CHART 4







LITTLE DELL LAKE - UTMH

HYD DES SEC 10 AUG 83 LMS

PMF REVISED AUG 1983

MAX ORDINATE = 34,581.5 OFS



DEPARTMENT OF THE ARMY  
OFFICE OF THE CHIEF OF ENGINEERS  
WASHINGTON, D.C. 20314

REPLY TO  
ATTENTION OF:

DAEN-CWP-W

1 NOV 1983

MEMORANDUM FOR THE ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: Reexamination of the Little Dell Lake Project, Utah - INFORMATION  
MEMORANDUM

1. The purpose of this memorandum is to set forth a plan of action to reexamine the benefits, cost allocation, flood control operation in light of recent experience, and to review storage dedication. This incorporates our understanding of the discussions held on October 24, 1983.

2. We envision that the reexamination will take about three months. Principal aspects of the reexamination are as follows:

a. Flood Control.

(1) Incorporate recent hydrology into the data base; simulate the 1983 flood operation of the reservoir to reaffirm or revise the flood control storage and operation curves.

(2) Incorporate flood damage data from the 1983 experience including recognition of extraordinary flood fight efforts that took place in Salt Lake City.

b. Water Supply. Reaffirm the need, support and timing for water supply, and operational characteristics and how they blend with flood control operations. Evaluate benefits based on most likely alternative (not at site) that can produce comparable output in the same time frame.

c. Recreation. Reexamine the need, support, and timing for recreation and recreation facilities. Further explore possibility for deleting or diminishing recreation as part of the Federal project and leaving the development for local interests at their own schedule.

3. Conditions and Constraints.

a. Benefit Analysis. Methodology will be in accordance with Principles and Guidelines; for recreation, travel cost or comparable methodology will be used in lieu of visitor-day values.

b. Interest Rate. Costs and benefits and cost allocation will be discounted at the authorized interest rate (3 1/4% in accordance with Section 80 of the 1974 WRDA).

11 NOV 1963

SUBJECT: Reexamination of the Little Dell Lake Project, Utah -- INFORMATION  
MEMORANDUM

c. Data on Current Interest Rate. Data on project benefits, overall costs, and resulting BCR will be presented at current interest rate.

d. Comparative Local Cooperation Requirement: Local cooperation requirements will be set forth and compared for alternative project configurations under traditional cost sharing and cost sharing/financing under current budgetary policies.

4. Scheduling. A schedule will be presented for major local cooperation contract negotiation to be initiated upon approval of this reexamination. A construction schedule will be presented by years for major contracts without regard to the calendar (1 year, 2 years, etc.).

5. Design Consideration. A parallel effort will be undertaken to update the current design requirements for the spillway. The cost will be incorporated in this reexamination.

FOR THE CHIEF OF ENGINEERS:

JOHN F. WALL  
Major General, USA  
Director of Civil Works

J. Breaden/272-0156  
Typed by Sandra Gore

Attachment 1  
Sheet 2 of 2



**RECREATION, PARKS and MULTI-PURPOSE  
CENTERS DIVISION**

3383 South 3rd East  
Salt Lake City, Utah 84115

**GARY C. SWENSEN**  
Superintendent

**M. TOM SHIMIZU**  
Commissioner

**CHRIS SEGURA**  
Director, Human Services

June 10, 1983

Commissioner M. Tom Shimizu  
City & County Building  
Salt Lake City, UT 84111

Dear Commissioner Shimizu:

As per your request, our Division has taken a look at the "Scaled Down Recreation Alternative" (see attached) which were made available to us by the Army Corps of Engineers. This alternative statement discusses (1) the initial development that would be required to provide recreational facilities at the proposed Little Dell Reservoir and (2) future development-facilities the Corps feels will be needed at some future time to complete the recreation development program.

Our planning staff and operations personnel have studied this scaled down version, taken a close look at each of the proposed items and our staff's comments, responses, etc. are also attached on the canary colored paper under the heading of Little Dell Meeting- June 7, 1983. As you can tell from comparing these two attachments, our staff are essentially in agreement with most of the recommendations made by the Corps of Engineers. Therefore, I am submitting this information to you at this time so that you will be able to reflect upon our Division's position.

We have not yet received back from the Utah State Parks and Recreation Division's planning section their analysis of the accuracy of the estimated maintenance and operating costs which would be required in order to properly maintain this project once it is completed. As you will recall, you asked Mr. Terry Green of the State Parks to study the Corps estimated operating costs to analyze whether or not the State of Utah, based upon their expertise and experience in operating water recreational facilities, are comfortable with the \$192,500.00 figure per year projected by the Corps. Keep in mind that that figure would reflect the maintenance and operation costs for the initial development of the project only. I know that you are anxious to study these comparisons so I am submitting this information to you at this time minus Mr. Green's analysis. As soon as we receive that we will forward that in to your office so that it can become a part of our overall study.

Commissioner Shimizu  
June 10, 1983  
Page 2

As you are aware, the Salt Lake County Recreation Board last Wednesday, voted to support the Little Dell concept. That letter of support is now signed and is being routed through Chris Segura's office, so it will undoubtedly be on your desk very shortly.

Very truly yours,

  
\_\_\_\_\_  
GARY C. SWENSEN  
Superintendent

GCS:ss

CC: Wayne Evans, Chairman Salt Lake County Recreation Board  
Charles Baugh  
Chris Segura  
Lee McQuivey, Army Corps of Engineers  
Terry Holtzworth, Flood Control  
LeRoy Hooten, Director of Public Utilities, Salt Lake City

Summary of Discussion

5. Proposed Recreation facilities-

- A. Visitor's center- We assumed that the center in the first phase would be the relocated pony express station. In any case we would recommend that the facility be limited in function to visitor and reservation check-in, basic park information, park administrative personnel and functions, and equipment-supply storage. The parking area should be limited to fewer cars than 24 and 2 buses, certainly not any more.
- B. Group Picnic Area- The three group picnic shelters would be sufficient and the capacity is maximum. We felt that 50 car capacity for parking may be low because there tends to be fewer people per car now days as compared to 4/car when plans were made. Probably 75 would be better for the number of cars.  
The idea for winter staging use is excellent provided there is ample opportunity for those activities. These shelters would be reservation areas. They will fulfill a great need.
- C. Group Camping Area- We were very concerned about this item because we realize the need for group overnight camping is critical. Yet we also understand that the maintenance and operational load increases substantially with overnight camping as compared to day use. We talked about the possibility of having very tight reservation procedures as a means of controlling the area's use. We also realized that one group area would do little to satisfy the demand. Perhaps the one area could be experimental and others could be added in the future.
- D. Family Picnic Sites- We felt that this would be adequate (75 sites)- The concrete or wood tables would be design decision later as could this idea of sharing grills. Definitely a reservation situation would be a way of better control on use.
- E. Beach- We thought the beach seemed too small, but agreed on the need for some swimming and sunning facilities.
- F. Two lane Launching Ramp- If the area would accommodate a 3 or 4 lane ramp, we favor the increased mobility and ease of launching afforded by the wider ramp. Agree with limiting the public use to manual and wind powered boats.
- G. Car-top boat launch area- This is a good idea! We could share or eliminate that if we go a wider ramp.
- H. Paved bike/hike trail- This would help to satisfy great demand we have for bikes, nature, and hiking (even jogging trails). 8 feet wide would be ideal, but 4 feet could suffice on the loops - 8 needed at starting and ending areas.
- I. Three softball diamonds- These diamonds and other athletic facilities would be good in association with the reservation areas. The back-stops for the fields should be simple single wing units. Horse-shoes and Volleyball areas would be good for those areas.
- J. Pony Express Station- The unit apparently is historic and should be preserved. The limited use referred to in item A would be our recommendation. Definitely it should be used as a major structural feature of the park and the native stone should be the architectural motif for



all other structures in the park.

- K. Youth Campsite- Our Recreation program people have expressed a need for many years for a youth campsite facility. This would be used primarily by our Recreation centers. Other youth groups ought to use it on the days we do not use the facilities. Our recommendation would be for day use only. It may be necessary to consider overnight use; however; we suggest only one night per group.
  - L. Circulation- Two way access and one way circulation roads are usually the best way to handle circulation in this type of setting.
  - M. Restroom facilities- We suggest the native stone design for permanent and vandal resistance as well as to follow the motif. We also suggest solar-chemical type facilities with low water use fixtures. The solar-chemical units should be tried soon in our area. We can evaluate their success by the time we need to move ahead with this project.
  - N. Treated Water Supply- We concur
  - O. Additional Parking- see other items to reflect our concern.
  - P. Landscaping- We may need to maintain lawn areas at the group reservation areas strictly for the athletic activities. Other landscaping would include boulders for vehicle control and selectively preserving native vegetation with some new plant materials used to supplement existing vegetation as needed.
6. Land
- The figures are conservative for 130 acres, but other areas can double for recreation and other uses concurrently. If the County does operate and maintain the park, we would have to rely on the services of the Division of Wildlife Resources for management of the fishery.
7. Costs
- The costs definitely are conservative. In other words our experience shows that these are minimal costs. The end figures a few years from now will be 5 to 6 million for the development and land costs would probably total over 2 million. The \$192,500 annual cost seems realistic, but our experience again would raise the figure to over \$200,000. Our concern as expressed by Superintendent Swensen is that we do not have adequate funding budgeted for our present maintenance and operations. There would have to be a commitment made for this funding in addition to present budgets. We cannot cut other programs for this!



## *Scaled Down Recreation Alternative*

(1) Initial Development. - Initially, the project would be developed to about one-third of ultimate development. In the future, after operational experience has been gained and there is a demonstrated need, additional facilities (see below) would be constructed.

4. The activity percentages have not changed from those used in the Phase I GDM Appendix, and are shown below:

Picnicking	- 50% (80% of which will be group picnicking)
Fishing	- 10%
Boating	- 10%
Swimming	- 20%
Other	- 20% (including sightseeing, group camping, bicycling, interpretation center visiting)

5. The initial proposed recreation facilities include the following:

- A visitor center near the main entrance to the park. This would include a display center, park manager's office, equipment storage room, and a parking lot for 24 cars and 2 buses.
- Three group picnic shelters scattered throughout the upper area, each with a capacity of 200 people. Each group area would include parking for 50 cars, as an alternative, 35 cars and 3 buses. One of the group picnic sites or parking areas would be used as a staging area for winter activities, such as sledding, snowmobiling, etc.

- One group camping area with capacity for 100 people.
- 75 family picnic sites, 65 in the upper area and 10 on the north hillside near the launching ramp. Each family picnic site would include a permanent concrete/wood table and every two sites would share a barbecue grill. All sites would utilize adjacent parking lots, as shown on plate 1.
- A sand swimming beach about 0.39 acres in size, in the upper area. The beach area would be provided with restrooms, change rooms, and showers.
- A two-lane boat launching ramp in the hillside area, utilizing existing Highway 65, for sailboats and other non-power boats.
- A car-top boat launch area, in the upper area.
- A paved bike/hike trail 8 feet wide, in two segments: The first segment would be 1-mile long and run from the visitor center, around the south side of the lake to Camp Grant below the dam; the second segment would be 1/2 mile long and connect with the hillside picnic sites.
- Three softball diamonds and other athletic-facilities to be constructed in open meadow areas.

- The Little Dell Pony Express Station, built in 1860, will be resited in the upper recreation area and used for public interpretation. The native stone of this old building will be used as the design motif for the other buildings in the recreation area.
- A youth group campsite would be included with a capacity of 100 people. In addition to the facilities mentioned above, the following would be provided:
- Two-way access and one-way circulation roads.
- Permanent flush restroom facilities, and portable toilets when needed. Permanent facilities will be low water-use flush toilets used in conjunction with septic tanks and an oxidation/evaporation pond. Other alternatives for sewage disposal will be studied at the master plan stage.
- A treated water supply.
- Additional parking to accommodate a daily total of 2,750 people, with an appropriate amount of the parking area allotted for buses.
- Landscaping of the recreation area and the trail.

6. About 130 acres of land at the Little Dell site, primarily at the upstream end of the reservoir, will be acquired for recreation purposes. Other project land would also be used for recreation and other purposes.

A fishery management program for the lake and Dell Creek will be implemented as recommended by the U.S. Fish and Wildlife Service and the Utah Division of Wildlife Resources. Initial recreation features are shown on Plate 1.

7. Costs for the plan of development are presented in Table 1 revised. Facilities costs based on October 1982 prices are ~~\$4,190,000~~<sup>\$4,200,000</sup> and costs of lands are \$1,170,000. Total costs are ~~\$5,360,000~~<sup>\$5,370,000</sup> with appropriate allowances for engineering and design and supervision and administration. The non-Federal share of costs would be one-half this amount or \$2,685,000, non-Federal interests would also assume the administration, operation, and maintenance of the recreation program, at a cost presently estimated at \$192,500 initially.

(2) Future Development. - Facilities needed to complete the recreation development program include the following:

- Three group picnic shelters, each with a capacity of 200 people, and parking as outlined in paragraph 2b(1), above.
- The swimming beach would be enlarged to 1.5 acres, and an additional restroom/change shelter/shower would be installed.
- Additional sanitary facilities would be constructed.
- Additional access roads would be constructed, and parking would be expanded to accommodate a daily total of 8,000 people.







January 10, 1984

Colonel Arthur Williams  
Corps of Engineers  
District Engineer  
Department of the Army  
Sacramento District,  
650 Capitol Mall  
Sacramento, California 95814

Dear Colonel Williams:

Enclosed are copies of Salt Lake County's recreation proposal for the Little Dell Dam project. Please include this revised document in your analysis and recommendation to the administration.

Please contact me if you need anymore information or if I can answer any questions you or your staff may have.

Sincerely,

*John Inch Morgan*  
JOHN INCH MORGAN  
Administrative Assistant

JIM:tb

cc: Lee McQuivey



THE INCLOSURE TO MR. MORGAN'S LETTER

IS THE

SCALED-DOWN RECREATION ALTERNATIVE

SHOWN ON SHEETS 5 THROUGH 9 OF ATTACHMENT 2

95. Construction schedule:

a. General. - The time required for construction of all features of Little Dell Dam and Lake will depend upon the rate at which construction funds are made available. With adequate funding, it is estimated that construction of the project can be completed within 5 years. To minimize overlapping contracts in the same area, the relocations work would have to be completed in the first construction season. The dam construction would be completed in the following 4 construction seasons. Due to seasonal interruptions, earthfill operations will normally be limited to the period 15 May to 15 November. However, concrete construction operations in the Outlet Works Tunnel and Emigration Creek Diversion Tunnel can be performed throughout the year. The construction contracts will include a provision so that plantings and restoration of the construction areas will be accomplished as early as practicable after the completion of respective features of the contract.

b. Construction contracts. - Construction of the project will be accomplished by contracts, except for the installation of certain hydrologic facilities which will use hired labor for technical reasons and the relocation of utilities which will be done by the owners.

c. Activity by season. - A construction sequence is summarized as follows:

(1) First construction season. - Start construction of the relocated State Highway No. 65; initiate and complete relocation of Chevron underground pipeline which will necessitate ordering of the required new steel pipe one year ahead of time; initiate and complete relocation of the Mountain Bell overhead telephone line; and initiate and complete relocation of Mountain Fuel Company gas line.

(2) Second construction season. - (1st construction season for dam and outlet works).

(a) Relocations. - Complete relocation of State Highway No. 65 by 30 June of the second construction season.

(b) Administration facilities and overlook area. - Initiate and complete construction of the permanent administration facilities, excluding the two residencies; initiate and complete construction of the access road to the administration area; and initiate and complete construction of the overlook area.

(c) Dam. - Initiate stripping of the foundation in the right abutment; initiate and complete excavation for the core trench; construct temporary flume over core trench; initiate concrete grout cap in the core trench; initiate installation of grout curtain in the core trench; and initiate embankment placement to elevation 5,725.0 in the right abutment with excavated material from the core trench.



(3) Third construction season.

(a) Dam. - Continue and complete concrete grout cap in the core trench; continue and complete installation of the grout curtain; initiate and complete construction of a cofferdam in the upstream embankment 31 August; and initiate and complete excavation of the valley floor.

(b) Outlet works. - Continue and complete concrete work to include intake structure, tunnel portals, tunnel lining, transitions, control room of shaft, and stilling basin; initiate and complete excavation of approach and exit channels; complete fabrication and installation of slide gates and bulkhead gates; divert flow through outlet works by 31 August; continue and complete outlet works by 31 October; and initiate and complete access road to outlet works.

(c) Recreation facilities. - Initiate and complete construction of recreation facilities, Phase I.

(4) Fourth construction season.

(a) Dam. - Continue and complete stripping of the foundation; and continue embankment placement to elevation 5,700.0.

(b) Spillway. - Initiate and complete spillway excavation; initiate and complete sill grout curtain; and initiate and complete concrete work for sill and walls.

(c) Emigration Creek Diversion. - Initiate and complete excavation of the tunnel portals and tunnel; and initiate concrete work for tunnel portals and tunnel.

(d) Parleys Creek Diversion. - Initiate and complete excavation of intake structure, exit structure and trench for pipeline; initiate and complete concrete work for the intake structure and exit structure; initiate and complete construction of pipeline; and initiate and complete construction of access roads to Parleys Creek Diversion structure and inverted siphons.

(e) Lake area clearing. - Initiate reservoir clearing.

(5) Fifth construction season.

(a) Administration facilities. - Initiate and complete construction of the two residencies in the recreation area.

(b) Dam. - Continue and complete embankment placement to crest elevation 5,842.0.

(c) Emigration Creek Diversion. - Initiate and complete excavation and concrete work for the diversion structure; continue and complete

work for tunnel portals and tunnel; initiate and complete excavation and concrete work for the exit structure; initiate and complete cut-and-cover conduit; and initiate and complete installation of gates and mechanical and electrical equipment.

(d) Recreation facilities. - Initiate and complete construction of recreation facilities, Phase II.

(e) Access roads. - Initiate and complete construction of access roads to the crest of dam, control shaft, stilling basin, and bridge over spillway.

(f) Permanent operating equipment. - Initiate and complete installation of hydrologic and communication facilities.

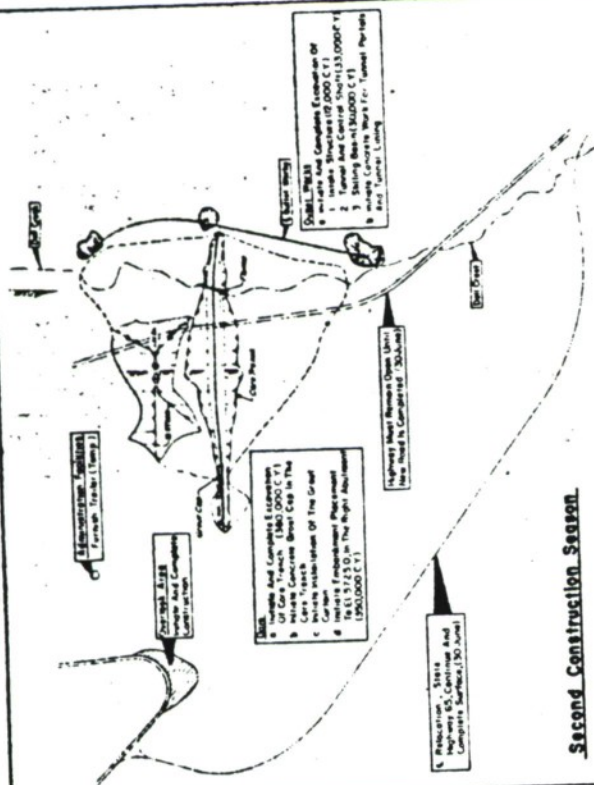
(g) Lake area clearing. - Continue and complete reservoir clearing; complete clean-up of working areas of dam, spillway, outlet works, Emigration Creek Diversion, and Parleys Creek Diversion.

96. Funds required. - It is anticipated that orderly prosecution of project design and construction as outlined above will require funding (based on 1 July 1974 price levels) by fiscal years as shown on Plate 24 and summarized below:

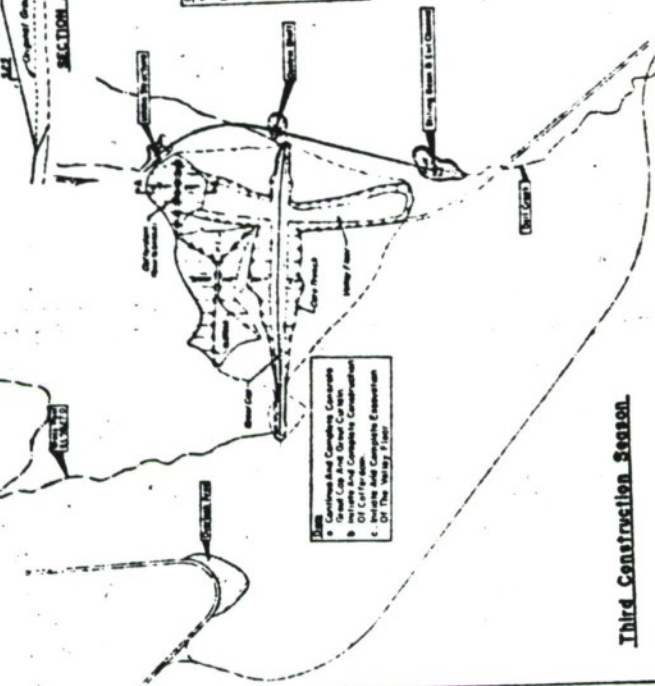
<u>Fiscal Year</u>	<u>Amount Required</u>
Through September 1976	\$ 1,975,000
FY 1 - First Construction Start	\$ 4,010,000
FY 2	\$ 3,625,000
FY 3	\$ 7,194,000
FY 4	\$11,727,000
FY 5	\$11,568,000
FY 6	<u>\$ 1,551,000</u>
Total Project Cost	\$41,650,000



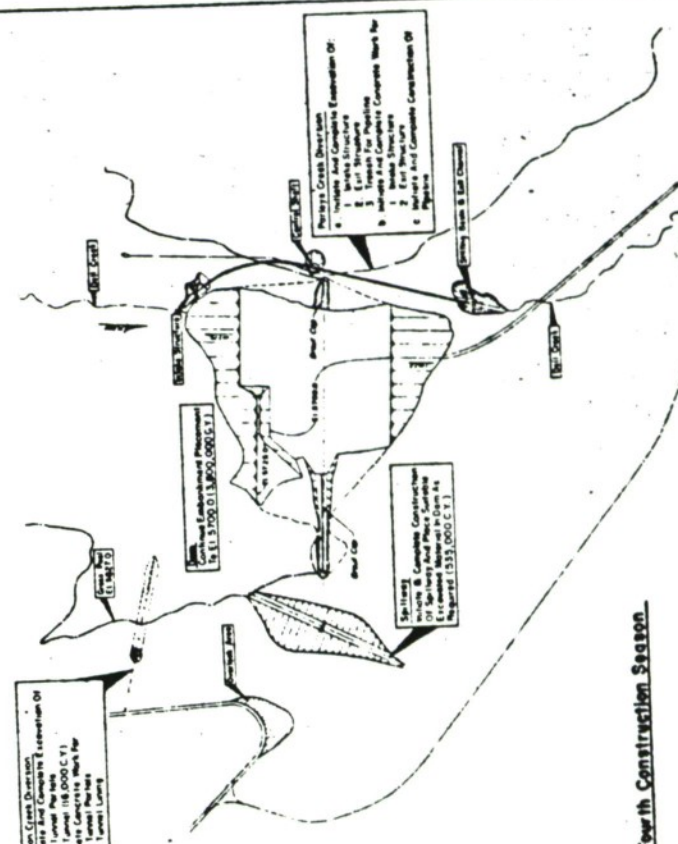
# VALUE ENGINEERING PAYS



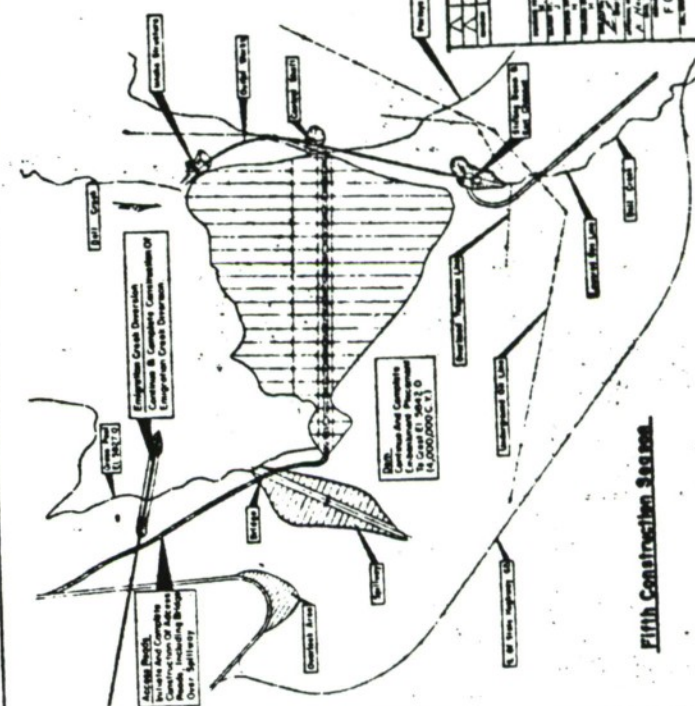
Second Construction Season



Third Construction Season



Fourth Construction Season



Fifth Construction Season

- First Construction Season**
- 1. Initiate Relocation and Construction of State Highway 65
  - 2. Initiate and Complete Relocation of Chevron Pipe Line Co. Underground Pipeline and Complete Relocation of Mountain Bell Overhead Telephone Line
  - 3. Initiate and Complete Relocation of Mountain Fuel Supply Company Gas Line

**NOTE**  
Refer To Page 3 For Relocations Layout

- Construction Season**
- 1. Initiate and Complete Construction of
  - 2. Initiate and Complete Construction of
  - 3. Initiate and Complete Construction of
  - 4. Initiate and Complete Construction of
  - 5. Initiate and Complete Construction of
  - 6. Initiate and Complete Construction of
  - 7. Initiate and Complete Construction of
  - 8. Initiate and Complete Construction of
  - 9. Initiate and Complete Construction of
  - 10. Initiate and Complete Construction of

**LEGEND**  
Construction Completed  
Construction Required

**NOTES**  
1. Normal Construction For Earthfill Operation Limited To 15 May Through 15 November.  
2. Completed Construction Season is At The End Of Normal Construction Season

CONSTRUCTION SEQUENCE	
1	Initiate and Complete Construction of
2	Initiate and Complete Construction of
3	Initiate and Complete Construction of
4	Initiate and Complete Construction of
5	Initiate and Complete Construction of
6	Initiate and Complete Construction of
7	Initiate and Complete Construction of
8	Initiate and Complete Construction of
9	Initiate and Complete Construction of
10	Initiate and Complete Construction of

LITTLE DELL LAKE PROJECT  
SALT LAKE CITY STREAMS, UTAH

DESIGN MEMORANDUMS

No.	Date	Title	Approved
1	Mar 1962	Hydrology (Superseded)	OCE, May 1962
2	Apr 1962	Reservoir Regulation (Superseded)	OCE, Aug 1962
3	Jan 1972	Hydrology (Revised Aug 1972)	OCE, Jan 1973
4	Sep 1974	General Design, Phase I Plan Formulation	OCE, Apr 1975
4	Apr 1976	General Design, Phase II Project Design	OCE, 2 Nov 1976
5	Sep 1974	Relocations	SPD, 13 Nov 1974
6	Jan 1975	Concrete Materials	SPD, 24 Apr 1975
7	Feb 1975	Site Geology	SPD, 24 Apr 1975
8	Feb 1978	Real Estate	
9	Sep 1977	Outlet Works	

OTHER PRECONSTRUCTION ACTIVITIES

Jul 1975	Final EIS to CEQ
Mar 1981	Section 404 Water Quality Certification
Oct 1982	Office Study, Economic Reevaluation



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8725 John J. Kingman Road, Suite 0944  
Fort Belvoir VA 22060-6218


22 October 2008

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Sacramento District Library  
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Sacramento CA 95814-2292

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The enclosed documents from USACE Sacramento District are hereby submitted for inclusion in DTIC's technical reports database. The following is a list of documents included in this shipment:

- ADB344304 • Lemon Reservoir Florida River, Colorado. Report on reservoir regulation for flood control, July 1974
- ADB344333 • Reconnaissance report Sacramento Metropolitan Area, California, February 1989
- ADB344346 • New Hogan Dam and Lake, Calaveras River, California. Water Control Manual Appendix III to Master Water Control Manual San Joaquin River Basin, California, July 1983
- ADB344307 • Special Flood Hazard Study Nephi, Utah, November 1998 (cataloged)
- ADB344344 • Special Study on the Lower American River, California, Prepared for US Bureau of Reclamation - Mid Pacific Region and California Dept. of Water Resources..., March 1987
- ADB344313 • Transcript of public meeting Caliente Creek stream group investigation, California, held by, the Kern County Water Agency in Lamont, California, 9 July 1979
- ADB344302 • Initial appraisal Sacramento River Flood control project (Glenn-Colusa), California, 10 February 1989
- ADB344485 • Report on November-December 1950 floods Sacramento-San Joaquin river basins, California and Truckee, Carson, and Walker rivers, California and Nevada, March 1951
- ADB344268 • Reexamination Little Dell Lake, Utah, February 1984
- ADB344197 • Special report fish and wildlife plan Sacramento River bank protection project, California, first phase, July 1979
- ADB344264 • Programmatic environmental impact statement/environmental impact report Sacramento River flood control system evaluation, phases II-V, May 1992
- ADB344201 • Hydrology office report Kern river, California, January 1979
- ADB344198 • Kern River - California aqueduct intertie, Kern county, California, environmental statement, February 1974
- ADB344213 • Sacramento river Chico Landing to Red Bluff, California, bank protection project, final environmental statement, January 1975
- ADB344265 • Cottonwood Creek, California, Information brochure on selected project plan, June 1982
- ADB344261 • Sacramento river flood control project Colusa Trough Drainage Canal, California, office report, March 1993
- ADB344343 • Detailed project report on Kern River-California aqueduct intertie, Kern County, California, February 1974

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- ADB344267 • Sacramento River Flood Control Project, California, Right Bank Yolo Bypass and Left Bank Cache Slough near Junction Yolo Bypass and Cache Slough, Levee construction, General Design, Supplement No. 1 to Design Memorandum #13, May 1986
  - ADB344246 • Redbank and Fancher Creeks, California, General Design Memorandum #1, February 1986
  - ADB344260 • Cache Creek Basin, California, Feasibility report and environmental statement for water resources development Lake and Yolo counties, California, February 1979
  - ADB344199 • Sacramento River Deep Water Ship channel, California, Feasibility report and environmental impact statement for navigation and related purposes, July 1980
  - ADB344263 • Sacramento River flood control project, California, Mid-Valley area, phase III, Design Memorandum, Vol. I or II, June 1986
  - ADB344262 • Marysville Lake, Yuba River, California, General Design Memorandum Phase I, Plan Formulation, Preliminary Report, Appendixes A-N, Design Memorandum #3, March 1977

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